

REPORT
ON THE
GEOLOGICAL SURVEY
OF THE
PROVINCE OF NEW-BRUNSWICK,
WITH
A TOPOGRAPHICAL ACCOUNT
OF THE
PUBLIC LANDS,
AND
THE DISTRICTS EXPLORED IN 1842.

BY
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PROVINCIAL GEOLOGIST, &c.

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1843.

REPORT

STATEMENT OF THE

LIEUTENANT-COLONEL

SIR WILLIAM MACLEAY GEORGE CORBRIDGE K.C.

Assistant Secretary and Comptroller of the

Public Works Department

NEW SOUTH WALES

It has been deemed proper to direct the Comptroller to have the accounts of the Public Works Department audited and to give a statement of the result of the audit. The amount of the expenditure during the year ending 31st March 1900 will be shown in the statement of the Comptroller. It will be observed that the statement shows a balance in credit of the Public Works Department of £1,000,000. This balance is the result of the expenditure of the Public Works Department during the year ending 31st March 1900.

The Comptroller has also to report on the expenditure of the Public Works Department during the year ending 31st March 1900. The expenditure of the Public Works Department during the year ending 31st March 1900 has been £1,000,000. This expenditure has been incurred in the construction of the Public Works Department during the year ending 31st March 1900. The Comptroller has also to report on the expenditure of the Public Works Department during the year ending 31st March 1900. The expenditure of the Public Works Department during the year ending 31st March 1900 has been £1,000,000. This expenditure has been incurred in the construction of the Public Works Department during the year ending 31st March 1900.

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REPORT.

TO HIS EXCELLENCY

LIEUTENANT-COLONEL

SIR WILLIAM MACBEAN GEORGE COLEBROOKE, K. H.

*Lieutenant Governor and Commander in Chief of the
Province of New-Brunswick, &c. &c. &c.*

MAY IT PLEASE YOUR EXCELLENCY,—

It has been deemed proper to divide the Report, which I have now the honour to lay before Your Excellency, into two parts; and to give a topographical, as well as a geological account of the districts explored during the past season. It will be observed that almost the whole of the country to which my labours have been recently devoted, is in a wilderness state, and still remains the ungranted property of the Government.

In consequence of the demand and price for the timber of the Province having been reduced, a great number of the inhabitants have been compelled to seek a livelihood by cultivating the waste lands; and one of the objects of the topographical part of this Report, is to supply information in regard to such districts as are best adapted for immediate settlement.

The knowledge heretofore possessed of some vast and important tracts of land within the Province, was confined to a few lumbermen, whose observations were directed to the timber found growing upon the surface; it was, therefore,

necessary that as much information as possible should be acquired of the interior of a Province, which had never been explored, with reference to the discovery of its natural productions, the quality of the soil, and the advantages it offered for settlement.

In the topographical part of the present Report, the soil, forests, and indigenous plants of the tracts explored, will be briefly noticed; also the rivers and lakes, with the facilities they offer for internal communication. Sites for canals, railroads, bridges, mills, &c. will also receive a passing remark, with a view to make the country better known and to develop its true features.

It will be seen in the body of the Report, that an immense extent of country, penetrated by fine navigable rivers, two of which are a hundred and fifty miles in length, is still uninhabited, and millions of acres of excellent land are unoccupied even by the native Indians.

The geological part of the work will contain a description of the rocks, minerals and soils of the country examined, with some remarks on the numerous fossils contained in many of the strata.

It was observed that the inhabitants in the new settlements were unacquainted with any proper method of burning lime, which may be advantageously employed in agriculture; and, therefore, directions for calcining and applying lime to the soil, have been appended to the geological part of the Report.

An incomplete Geological Map of the Province is also submitted for Your Excellency's consideration. By this it will be observed that the labour of another season will be required to bring the geological survey to a conclusion; and it is very desirable that the undertaking should be finished in the same spirit in which it was commenced.

In the performance of the duty I was called upon to undertake in reference to the exploration of the territory recently in dispute between Great Britain and the United States, I have been able, with the assistance of my son, to carry on the geological reconnoissance of the upper country; and, under a due allowance for the difficulties and hardships attending the survey of an uninhabited wilderness, I have no doubt that the whole will meet with a favourable consideration.

INTRODUCTION.

THE numerous advantages that have resulted from the detailed written accounts of Canada, Prince Edward Island, and other North American Colonies, are now seen in the flourishing conditions of those Provinces; and it is evident that New-Brunswick, whose soil and climate have been much underrated by persons abroad, only requires to be better known, when they would be justly valued, and the Province would rise to that state of strength and prosperity her resources are capable to sustain.

After the geological exploration was commenced, the attention of farmers was directed to the application of marl to their lands. Since the discovery of that useful substance, a great number of specimens have been examined besides those found by myself. Many of these have proved to be of a good quality, and their employment as a manure is yearly increasing, the benefit derived from their use being admitted by all who have given them a fair trial.

Limestone has also been discovered where it was not previously known to exist, and a number of kilns have been erected during the last year to supply lime for manure. A similar remark will apply in regard to peat, which, with other vegetable matter, is finding its way into use, being employed in composts in different parts of the Province.

During the last four years a general spirit of inquiry has been infused into the minds of the inhabitants, who have begun to search for all the valuable natural productions of the country,

and to employ them whenever practicable in the arts and agriculture.

We have found persons endeavouring to make lime from rocks containing but little of that mineral, while the good limestone at hand was neglected. The directions for burning lime in the appendix to this report will be useful to those who have not hitherto paid sufficient attention to the construction of kilns and a proper mode of calcination.

We are not acquainted with an instance where marl was used as a manure in the Province previous to the commencement of the geological exploration; it is now employed in different parts of the country, and successfully applied to all the sandy soils and mixed in composts. The discovery of marl along the shores of Gloucester and Restigouche Counties is highly important to the farmers in that quarter; and the excellent crops of wheat raised from marled land during the past season, are the best recommendations of its virtues. Limestone, marl, peat, sea-weeds, and decayed vegetables are the natural manures of the Province, and the success of agriculture in some districts will greatly depend upon their judicious management and use.

The geological inquiry instituted by the Province, has been the means of affording information, respecting the country, to persons abroad, and now that the difficulties are removed in reference to the settlement of the Boundary dispute, British and American capital will be introduced and the resources of the country opened. The same inquiry has brought into use granite, freestone, limestone, &c. with other substances of the mineral kingdom.

From the great expense of opening mines, the advance from their first discovery to their successful and profitable operation, is necessarily slow. Preparations are in progress for opening the Coal Mines of New-Brunswick, and the period will arrive when both her coal and iron will be extensively worked. The great depression which has existed in the commercial affairs of almost the whole world during the past year, has retarded the advancement of mining in all the Colonies; but this circumstance does not render it less necessary that the resources of those Colonies should be examined, and their nature understood. Since the geological exploration was com-

menced in New-Brunswick, a similar work has been begun in Canada, and there can be no doubt that the United Provinces will reap great benefits from the undertaking.

In the interior of the Province there are millions of acres of excellent lands still remaining in a wilderness state. The nature and character of these lands have not been known; and the value of the soil, with the advantages offered for settlement, have heretofore been but very imperfectly understood. Several of these uninhabited districts have been explored during the past season, and wide tracts of superior land which possess every advantage for immediate cultivation, have been discovered.

The valleys of the Tobique and Restigouche, with large tracts situated upon their tributaries have been examined, and, besides their mineral wealth, the quality of the soil, the facilities of communication, and other particulars connected with their improvement, have been ascertained. By these surveys the inhabitants of the Province will acquire a better knowledge of the country, and the same kind of knowledge, by being carried abroad, will be the means of directing a respectable class of settlers to New-Brunswick. It is thus that the materials for a complete work on the statistics of the Province are collected, the publication of which would remove many erroneous opinions held by those who are unacquainted with the country. Several writers might be quoted who have stated that New-Brunswick, from the coldness of the climate, can never become an agricultural Province, and some have endeavoured to make it appear that it enjoys scarcely any summer, and that there is no autumn on this part of the globe. Such opinions have been set forth without any correct knowledge of the country, or its climate, and would be contradicted by an appeal to the true character of the Province.

In the Counties of Gloucester and Restigouche, the most northern parts of the Province, excellent crops of wheat were raised last season, and there was scarcely an instance found where the crop of grain of any kind had failed. Compared with the former year a double quantity of bread stuffs has been produced throughout the Province, a circumstance that may be justly ascribed to the greater attention paid to agriculture. For the production of potatoes, and other nutritious roots, New-

Brunswick cannot be excelled. If heretofore the crops of grain have been uncertain, a defective system of farming has been the chief cause. Negligence in sowing early in a country where the season is short and vegetation rapid, will be followed by disappointment at the harvest.

It may appear surprising to many, that from the great number of emigrants, who yearly land in North America from Great Britain, so few of them remain in New-Brunswick, where as many advantages are offered to the agricultural settler as can be found in any part of America; and where all those liberties are enjoyed which are so congenial to British subjects. But upon inquiry, it will be found that the tide of immigration generally flows into any country, in proportion to the amount of employment offered to those who are under the necessity of labouring for their daily bread. The great number of settlers who have emigrated to Canada during several past years, have found employment on public works, or they have been assisted in procuring lands through the benevolence of the Government, or companies formed for the purpose.

From the great number of public works carried on in the United States, by the inhabitants, and by the expenditure of British capital, employment has been given to thousands of Irish labourers, who finally become settlers. The vast sums of money advanced by persons in England to open canals and railroads, or to be expended upon other public works, have not only been the means of facilitating the improvements in that country, but they have also increased the strength and population of a foreign power. Of the great number of immigrants who yearly land upon the shores of New-Brunswick, almost all depart for the United States. The few that remain are of the most indigent class. This current of human beings cannot be checked until inducements, similar to those alluded to, are held out in the Province. Public works are not only useful for their intrinsic value, but they bring with them money and labour.

The numerous writers on Canada have spared no pains in their descriptions of the topography, climate and productions of that country; and that kind of encouragement has been offered that the emigrant requires, before he leaves the home of his fathers. But this kind of stimulus to emigrate has been

neglected in New-Brunswick and Nova-Scotia. Whatever merits the histories of these Provinces may possess, as works of literature, they contain but little that has been exclusively devoted to the topography, productions, and resources of the Provinces. It cannot, therefore, be surprising that so little is known in the mother country of the advantages these Provinces possess for affording the elements of industry, comfort, and independence to her overflowing population. In the British Parliament emigration to the United States is often noticed, and Canada is spoken of in glowing terms; while New-Brunswick is passed by as being almost unknown as a part of the British Empire. A full, clear, and accurate account of the physical geography, climate, soil, natural productions, and resources of the Province is still a desideratum. The extent and value of the country are almost unknown on the other side of the Atlantic, and, until very lately, scarcely any attention has been paid to her real worth to the nation, as an asylum for the overgrown population of Great Britain.

Another reason why a more respectable class of emigrants than that which has hitherto appeared, has not been directed to New-Brunswick, arises from the lack of manufactories and mining. Thousands of tradesmen when they land upon our shores afterwards depart for the United States, because they cannot find employment in their particular occupations. The progress of manufacture in all new countries must be slow; and so long as the price of land remains low, and soil for tillage can be obtained by the industry of a labouring man, the price of labour will check manufacturing enterprise.

The remedy for the impediments to the introduction of a sound and healthy emigration into the Province, evidently consists in supplying correct information in regard to her physical features, soil, climate, and resources, and the medium through which it offers employment, livelihood, and independence to every temperate and industrious settler. Immigration to be successful must be voluntary, and legislation is only required whenever it may be deemed necessary to assist those who are without the means of raising themselves to a situation in which they would be able to live without public or private aid.

One of the objects of the topographical part of the present report, has been to afford information upon the physical cha-

racter of New-Brunswick to persons residing beyond the Atlantic, and to such as are already in the country, who may be desirous to purchase and to settle upon unoccupied lands.

The surveys of tracts of ungranted lands in different parts of the Province, and the increased facilities for obtaining them introduced by Your Excellency, have produced already the beneficial effects anticipated, and greatly promoted the cultivation of the soil. The new settlements opened through the influence of the above means have afforded encouragement to industrious persons, and never, since the first inhabitants landed in the country, were wild lands taken up and cleared with so much rapidity and zeal.

A great number of persons who, from a depression in the timber trade and the demand for ships, were deprived of employment, have embarked for the forest, and are fast laying the foundation of future independence and comfort. There are also many instances of persons returning from the United States to cultivate the soil of New-Brunswick. A number of respectable immigrants have also had their attention directed to this quarter, while the general improvement of the agriculture of the Province has received a new impetus.

During the geological exploration, I have had an opportunity to examine the chief part of the unoccupied lands in the Province, and much of my time of late has been devoted to giving information to persons who are anxious to purchase ungranted lands.

A work which had been commenced on the topography, geology, agriculture, and statistics of the Province, is advancing, being intended to embrace all the information acquired during the geological reconnoissance. This work will be laid before Your Excellency as soon as possible after the exploration is completed, and it is very desirable that it should contain an account of every section of New-Brunswick, as well as a geological map of the whole country, objects which can only be gained by a completion of the survey which is now far advanced.

The geological survey of the Province had been extended westward and northward, as far as Woodstock, and from thence in a northeast direction to Boiestown and Newcastle, upon the Miramichi River. During the past season the exploration was

advanced from Woodstock to Madawaska, and all the strata have been carefully examined wherever they are intersected by the main river, or its tributaries in that quarter.

The Tobique is a large stream upwards of a hundred miles in length, and it extends into the interior of the Province through an uninhabited but beautiful valley. The geology of this district has also been ascertained. The gypsum along its banks has been examined, and vast quantities of limestone, iron ore, and other minerals have been discovered.

The whole of the strata from Madawaska to Dalhousie, along the courses of Grand River and the Restigouche, have also been explored, with a part of the coal field discovered at the entrance of that river. The shores between Dalhousie and Bathurst, with the numerous deposits of limestone and marl in that quarter, have been but partially examined, and the latter part of the autumn was devoted to a further exploration of the coal field situated northward of Ten Mile Creek, in the County of Saint John. The chief parts of the County of Northumberland, Gloucester, Restigouche, and the western territory still remain to be examined, and, from their great extent, they would require the labour of another season, which would complete the geological survey of the whole Province.

PART I.

TOPOGRAPHICAL REPORT.

As the physical features of every country are the result of geological events, which have taken place upon the earth's surface, it would, perhaps, be more in accordance with the order to be observed in all scientific inquiries, first to give the details of geological structure, and then to advert to the general conditions of the district under consideration; but it has been found more convenient, in the present instance, to make the general character of the country understood, and then to describe its geological peculiarities.

From the unsettled state of the boundary between New-Brunswick and the United States, the North-western limits of the Province were undefined, nor has there been, up to the present time, any fixed line of separation between Canada and New-Brunswick.

Of late years the Restigouche River has been assumed to be the boundary between the Provinces; but it will be seen hereafter that this river would be an inconvenient line for that division. High mountainous and broken ridges of land are far better adapted for such boundaries than navigable rivers.

It will be observed, in another part of this Report, that, from the little that was known of the country, a branch of the Restigouche has been mistaken for the main stream, the sources of which are near the Metis Lake in Lower Canada, and Lake Tamisquata on the portage between the Saint John and the

Saint Lawrence. If the main Restigouche be taken for the divisional line between Canada and New Brunswick, a vast tract of uninhabited country will be attached to the latter, which was formerly supposed to be within the limits of the neighbouring Province.

It is very desirable that the boundaries between the Provinces should now be adjusted. The western limits of the Counties of Carleton and Restigouche have never been fixed, and it will be necessary to form two or three new Counties in the western part of New-Brunswick, since the dispute of the national line has been settled.

Between the Saint John and the Bay Chaleur and the supposed limits of Lower Canada, there are no less than ten thousand square miles of uninhabited country, and one half of this area is yet unexplored. One of the objects of the exploration of the present season was to ascertain the character of a part of this immense tract, and the labour of a whole year would be required to complete the work.

Viewed altogether, the western part of the Province presents great diversity of character. The surface of the country between Woodstock and the Presq' Isle is undulated, but not high. In ascending the Saint John it becomes more elevated, and mountains of considerable altitude begin to appear.—Among these is Mars' Hill, upon the American boundary. Between them and the Grand Falls, the surface is raised into long parallel mounds, while at Madawaska the land is comparatively level.

A branch of the Alleghany chain of mountains passes through the Northern States. Cataadan, in Maine, is the loftiest eminence on their western borders, being five thousand three hundred feet above the level of the sea. It belongs to that range which crosses the Saint John and enters the Province. In the same range, there are Mars Hill, Moose and Bear Mountains near Des Chutes River. The same chain of mountains extends in a northeast direction to the sources of the Miramichi, Nepisiguit, Upsalquitch, and Tobique Rivers, where the mountains are upwards of two thousand feet in altitude. This mountainous district gradually disappears, as it approaches the Bay Chaleur, and the lands along the coast between Bathurst and Dalhousie are comparatively low and level.

Another alpine ridge extends through the district of Gaspé, and separates the waters that fall into the St. Lawrence from those that descend into the Saint John and Bay Chaleur.

The Tobique, Nepisiguit, and Upsalquitch Rivers all take their rise in the termination of the New-Brunswick range, and having descended over numerous falls and swept along the valleys, they are at last lost in the larger streams that communicate with the ocean.

The chief part of the wilderness country explored during the past season is well adapted for agriculture, and in many tracts the soil is of a superior quality. Even among the highest mountains there are many slopes and valleys of good land, watered by the rivulets of the hills as they pursue their downward course. The scenery in these regions is beautiful beyond description. Excepting the tops of the mountains and the sides of perpendicular cliffs, the whole face of the country is covered by one close unbroken forest. The spruce, fir, pine, and other evergreens are thinned off towards the summits of the highest peaks, until the naked rock appears, and the highland valleys are buried in one dense mass of stately trees.

In the interior there are many lakes, which are frequently united by channels sufficiently deep to admit of the passage of canoes. The Restigouche and Tobique are without falls, except near their sources. The Nepisiguit has a splendid fall of seventy feet. The whole of these rivers abound in salmon, trout, and other kinds of fish, and they frequently run through fine tracts of intervale. It is remarkable that a district so extensive and possessing so many advantages, with a good soil, should have remained in a wilderness state up to the present time. But it is necessary to proceed to a more detailed account of the country examined, before entering upon a description of its geological features.

It may here be remarked, that in consequence of the late dispute between Great Britain and the United States, with reference to territory situated between New-Brunswick and the State of Maine, it was necessary to obtain as much information as possible in regard to the nature, resources, and value of the district claimed by each of those powers. In the Report of the Land Agent of the State of Maine, it was proposed that all the territory south of the Saint John should be surrendered to the

United States, for land situated northward of that river. My observations were therefore first directed to that quarter, the reports of which have already been submitted to Your Excellency.

The tract under consideration extends along the banks of the Saint John from Eel River to the Grand Falls, a distance of eighty miles, and upon it are situated the town of Woodstock and a number of flourishing settlements. It is bounded on the east by the main Saint John, on the south by Eel River and its lakes, and on the west by a due north line from the Monument to the Grand Falls. It embraces the Parishes of Woodstock, Wakefield, Andover and Wicklow,—contains three hundred and sixty thousand acres of excellent land, with a population of about eight thousand souls.

There are five rivers flowing into the Saint John through this tract; they are, Eel River, Meduxnakeag, Presq' Isle, Des Chutes, and the Aroostook; besides these there are several smaller streams. The sources of Eel River are within the Province of New-Brunswick, but the sources of the other rivers are within the State of Maine. All the timber cut along the courses of these streams must pass through channels which belong exclusively to the Province.

Eel River is about thirty-five miles in length, and proceeds from a lake ten miles long. Between this lake and the North Cheputnecticook Lake the distance is only three miles. It was along this river and these lakes that the Indians formerly pursued their route from the Saint John to the Penobscot.

Eel River and its beautiful lake are navigable for boats and rafts of timber, excepting the rapids near the river's mouth, and the Ledge Falls near the lake. The former might be much improved; at the latter place it is necessary to make a portage. At its upper part it passes through a tract of good land, and its banks are skirted with intervalles. The good quality of the lands here have induced a number of settlers to establish themselves in the forest, and villages are springing up in this part of Carleton. The forests consist chiefly of hard wood; the pine that still remains is remote from the river. The intervalles abound in elm and maple. Salmon, trout and perch are abundant, and will supply a considerable quantity of food to the new settler. A large tract of excellent land still remains un-

granted. The fears that were entertained by the first settlers, in regard to early frosts, have been removed, and Indian corn ripened well last season upon lands that were cleared in the spring.

The Meduxnakeag passes through the town of Woodstock, where it is crossed by a substantial bridge, a short distance from its mouth. At the site where it empties into the St. John, excellent saw and grist mills have been erected. The lands on the sides of this river have been granted, and, being of an excellent quality, they are now under cultivation several miles above the town. The river is navigable for canoes and rafts of timber to the distance of twenty miles, and it forms a water communication from Houlton, a small town and military post twelve miles west of Woodstock, on the American side of the line.

The town of Woodstock contains about two thousand inhabitants. From being situated at the extremity of the Houlton road, the thoroughfare between the Province and the State of Maine, and from its advantageous position with respect to the timber trade, it has rapidly grown into a place of some importance; and, from being surrounded by a fine agricultural country, its steady advancement appears to be certain. The villages of Richmond and Jacksontown, with the settlements extending from them in every direction, give this parish an ancient appearance. Thirty years ago the principal part of its surface was covered with a dense wilderness. The lands are remarkably fertile, and the town is very pleasantly situated on the west bank of the Saint John.

Directly below the town there is a large tract of high terraced intervalle of a superior quality. This intervalle, and the uplands adjacent, are in a fine state of cultivation. The terraces have been noticed in a former Report, and the causes by which they have been produced are explained by the evidences that exist of the river having from time to time changed its level. There is a road extending from Jacksontown, three miles west of Woodstock, to the Big Presq' Isle, and thence into the State of Maine and to the main river. The lands along this part of the American boundary are also very fertile, and capable of immediate improvement.

Both banks of the Saint John are settled from Woodstock to the mouth of the Tobique, fifty miles above. A number of

the settlements are however only in their infancy, and there are distances of several miles where clearings have only been commenced.

A few miles above Woodstock the intervale becomes narrow and scanty. It is terraced along the whole course of the stream; sometimes five different steps are seen on the shore, whereby the same number of changes in the level of the stream is indicated. The valley through which the river passes is diminished in width, and the stream runs between banks of sand and gravel from thirty to fifty feet in height. Great numbers of logs and pieces of pine timber are collected during the winter and piled upon the brink of the river. In the spring they are launched into the stream. We were placed in a very dangerous situation in ascending the Saint John, by reason of our canoes being unperceived by the lumbermen on the cliffs. An avalanche of timber was made at the moment we were beneath, but, by the quick and well-timed exertions of our Indians, the range of the logs was passed, and the rolling mass of wood was plunged into the water a few feet astern of our canoes.

The village of Wakefield, twelve miles above Woodstock, is pleasantly situated. It is surrounded by a number of excellent farms, and roads have been opened to Jacksontown and other new settlements remote from the river. The soil is of the most fertile kind, and its cultivation is yearly improving. The river, with its wooded Islands and high terraced border, surmounted by cultivated uplands, is well calculated to strike the traveller's eye after he has ascended from the tamer scenery below. The Saint John is here a furlong in width, and it runs smoothly along at the rate of six miles per hour. The timber on the uncleared lands consists of spruce, fir, and cedar, interspersed with groves of birch and maple. The ungranted lands are situated from three to six miles from the river, and they are generally of an excellent quality.

Restricting our observations to the west bank of the Saint John, the above remarks will apply still farther upwards to the Presq' Isle. This is a considerable stream, but from the number of its rapids, it is scarcely navigable for canoes. It is useful in affording a channel whereby timber is floated down to the main river. One of its branches bends around the base of

Mars Hill, and receives a number of small rivulets that descend from the side of the mountain.

Between the Presq' Isle and the River Des Chutes there is an abundant supply of limestone, but the few kilns that have been erected for burning the rock are altogether unfit for the purpose. A description of a proper lime kiln is annexed to this Report.

The Des Chutes is but a small stream. Excellent mills have been erected at its mouth by Mr. Perley, of Woodstock. At some former period this river had a fall of sixty feet: the water has worn down the rocks, so that a fall of only ten feet remains. The terraces above the mills are sixty feet above the present level of the main stream.

Mars Hill, of boundary notoriety, is situated about five miles from the Saint John, southward of Des Chutes River, which passes along its northern base. A lumber road commences at Mr. Pomphrey's barn, and meets a path cut by the American Commissioners in 1841. As the whole surface is shaded by a thick growth of lofty trees, the hill cannot be seen at any great distance, and a guide is therefore necessary.

Notwithstanding the sides of the hill are very steep, they are covered with a heavy growth of white and yellow birch, beech, and hard maple. No rocks were seen until we had approached very near to its summit, where the soil reposes upon fragments of conglomerate, of which rock the whole eminence is composed. The top of the highest peak was cleared by the commissioners under the treaty of 1794. It contains about six acres, and is now covered with an undergrowth. Fragments of the old wooden observatory still remain, with the relics of another erected by persons employed to explore a railroad line from Saint Andrews to Quebec. It was curious to observe the terms of defiance, which have been written both by American and British subjects upon these remains, but whose hostile feelings are now fast subsiding.

The height of Mars Hill, according to the Report of Messrs. Featherstonhaugh and Mudge, is 1668 feet. From its summit there is a most extensive and interesting view. The lofty Cataadan, sixty miles distant, appears quite near; Moose Mountain and the chain of high lands already mentioned are seen stretching away to the northeast. The valleys of the Aroos-

took and Tobique are also seen extending in opposite directions, but excepting the village of Houlton and a small clearing on the Saint John, the view is one of a vast wilderness, which seems to be too extensive to be removed by the industry of human beings.

The old British line strikes the hill near the centre; the line run by the American Commissioners in 1841 also touches the mountain, but not at its highest part, being nearly half a mile farther eastward than the original one.

The whole of the lands in the vicinity of this eminence are of the most fertile kinds, the soil being a deep rich loam. They are covered with a heavy growth of hardwood. But in consequence of the large grants individuals have obtained of these grounds, they remain uncleared, and the improvement of the country is retarded; because, few settlers will approach a large tract, whose proprietor will not improve his grant, nor contribute to the opening of roads by which the value of such property is greatly increased.

The mountain chain, of which Mars Hill is only an insulated point, pursues its course to the northeast, having, within its range, Bear Mountain, Moose Mountain, and the hills of the Monquart. Blue Mountain, near the Tobique, is the next eminence of any considerable altitude in this branch of the Apalachian chain.

The surface of the country between the River Des Chutes and the mouth of the Aroostook, and from thence to the Grand Falls, is very uneven, being traversed by those long parallel ridges common to the flanks of the chain alluded to. These ridges also cross the Saint John in a northeast direction. Notwithstanding the unevenness of the surface, the lands are of an excellent quality, and there are many fine level tracts along the bases of the hills. The soil contains an admixture of lime, and is admirably adapted to the raising of wheat and other kinds of grain. There is still a large quantity of ungranted land in the rear of the river lots, whose fertility is not surpassed by any in the Province.

The Aroostook or Restook is an important tributary of the Saint John. It rather exceeds the Tobique in size. It takes its rise in Lakes Millinoket and Millinoketsis, near the head waters of the Penobscot, in the State of Maine. Mr. E. Holmes,

who was employed by the State to explore this river, states that the distance between one of the tributaries of the Penobscot and the Aroostook is only two hundred and eighty-six rods.—The river falls into the Saint John from the westward, and is navigable for rafts of timber and canoes upwards of one hundred miles. In its course it receives ten minor streams; they are the Presq' Isle, St. Croix, Umqualqua, Limestone Stream, Little Madawaska, Salmon Stream, Beaver Brook, Little Machias, Great Machias, and Mooseluck. The main river and several of its tributaries run through an expanded valley of excellent soil, and the streams are skirted with intervalles. The pine forests in the vicinity of the above river have not been felled, and for a number of years they will afford a great annual supply of the best timber.

About forty miles above the mouth of the Aroostook, an extensive bed of excellent iron ore was discovered by Dr. Jackson, during his geological survey of the river. This ore is situated on lands belonging to the Hon. William Black, Mayor of Saint John, who has expended a considerable sum of money in making improvements on this part of the Aroostook.

By the ratification of the late treaty in the settlement of the boundary question, the whole of the Aroostook territory is transferred to the State of Maine. The river, and the land on both of its sides, at its mouth, to the distance of five miles from its exit into the Saint John, belongs, nevertheless, to the Province of New-Brunswick, and all the natural productions of the country must descend into the Province, before they can be conveyed to market.

Fort Fairfield is situated on the boundary line, where it crosses the Aroostook, about five miles from the Saint John.—Fifteen thousand tons of pine timber were ready to be removed down the former stream in July last, having been detained until the border difficulties were removed. About two miles below the fort, and on the British side of the boundary, the Aroostook passes through a narrow gorge where there is a frightful rapid. At the lower part of the rapid there is a fall of seventeen feet, by two steps, into a beautiful basin. A rock situated in the middle of the falls divides the stream, and the cliffs on each side are forty feet high. These falls have retreated some distance, and now offer a very interesting spectacle.

Between the falls and the river there are two dangerous rapids. In one of these we were placed in imminent peril, and one of our canoes was nearly filled with water in passing over an unexpected "pitch," which, in descending, was not seen until every exertion to avoid it was rendered unavailing. A few days previous, a stranger in a log canoe passed the upper rapids, and was on the brink of the falls, when, perceiving his danger, he sprang from his canoe, laid hold of a rock and with great exertion saved his life. The canoe was carried down the falls and torn to pieces. The above locality offers an excellent site for mills, and, from the trade that will result from the settlement of the boundary, a town will soon be built at the mouth of the river.

The distance between the Aroostook and the Grand Falls is eighteen miles. The Saint John here runs at the rate of eight miles an hour, and between banks of gravel and cliffs of rock from forty to sixty feet in height. The sides of the river are not cleared, and there is scarcely an inhabitant along the shores. Three and a half miles below the Grand Falls there is a powerful rapid called Rapid de Femme; above this there is another called the White Rapids. The lands on each side of the Saint John at this point are hilly, the soil is, nevertheless, fertile, and there is a quantity of good land, sufficient for many large settlements, still ungranted. Extensive surveys have recently been made in the neighbourhood of the Grand Falls, in order to facilitate the settlement of new lands.

The Grand Falls of the Saint John are situated two hundred miles from its mouth, and one hundred and twenty-five miles above Fredericton. Between Saint John and Fredericton the river resembles a lake, and the current is moderate. Between Fredericton and the Grand Falls the current runs at an average rate of six miles an hour. The stream is, nevertheless, navigable for steam boats of proper construction throughout the whole of the above distance. Above the Falls the river bends away to the southwest, and finally terminates in small lakes at the head of Connecticut River, having traversed a tract of country upwards of four hundred miles in length.

The majestic Saint John having received its numerous tributaries above, and swept along the Madawaska District, expands into a beautiful basin where the current is inconsider-

able. This basin affords a safe landing place for rafts of timber, canoes, &c. Immediately below, the basin is contracted, and the river makes a sudden *détour* to the south, and the whole mass of water is poured into a deep rocky gorge, averaging only two hundred and fifty feet in width.

From a peculiar notch in the rock, the water descends into the gorge from the front and on each side, and the river falls fifty-eight feet over a perpendicular cliff of calcareous slate.— In the mist that ascends from the bottom of the gorge, there is an every-varying rainbow arching the roaring vortex, and jets of white spray seem to sport over the troubled pool. On the brink of the fall the water descends six feet, and it runs so smoothly that its surface appears to be oiled. With these there is the deafening noise of a falling river, which many may imagine, but few can describe.

The gorge is three quarters of a mile long, and is flanked with perpendicular and overhanging cliffs from eighty to a hundred and fifty feet high. It is a narrow and frightful chasm, lashed by the troubled water, and excavated by the boiling eddies and whirlpools always in revolution. At last the water plunges into a basin below in an immense frothy sheet, where it becomes more tranquil and the stream resumes its original features. The river seems to be swallowed up by the earth, and again poured forth from a dark subterranean channel too narrow to give it vent.

The water also descends fifty-eight feet in passing along this rocky gorge, making the whole fall of the river at this place no less than one hundred and sixteen feet, which is the difference of level between the upper and lower basins. The height of the perpendicular falls had been stated by different writers to be seventy-four to seventy-five feet. The measurement I have adopted was taken by an order of Major Graham, one of the American Commissioners, and although it differs a little from our own, we believe it to be most correct, and for it we beg to offer that gentleman, Mr. F. Schroeder, and the whole of the exploring party, our sincere thanks. For the benefit of travellers, it may be remarked that the above falls are on the great road from Fredericton to Quebec.

We had an opportunity of witnessing the descent of a quantity of pine timber over the falls at the time of our explo-

ration. Pieces of pine, sixty feet in length, will sometimes shoot up into the air endwise nearly their whole length, and large trees are frequently broken. The projecting rocks along the sides of the gorge produce eddies, into which the timber is often drawn and made to revolve against the rocks until it is much injured or ground to pieces. Whole rafts are sometimes detained in these eddies, to the great loss of the timber dealers.

To obtain a good view of the falls, it is necessary to descend with great care into the gorge, where they appear in all their grandeur, being only surpassed in British America by the cataract of Niagara. Immediately adjoining the river, at this place, there is a small village. The lands on the little peninsula formed by the bending of the stream still belong to the crown, and they are admirably situated for the town which has recently been laid out by an order of the Government. The soil is good, and every circumstance connected with the place is calculated to render it interesting and important. A bridge may be thrown over the narrow chasm below the falls, whereby an easy communication would be obtained between the opposite sides of the river; and along a ravine that extends nearly across the peninsula, it is practicable to open a canal, with locks, to avoid the falls and render the navigation safe. In the mean time a sum of money would be very usefully expended in removing several large rocks below the cataract, where timber is often detained and injured.

Between the upper and lower basins there is a portage road one hundred and fifty rods long. All the goods, boats and canoes that ascend and descend the Saint John must be transported across this portage. The site of the falls is therefore an important military post, and, as such, has been occupied from time to time during the last fifty years.

Directly on the side of the "great pitch," extensive saw mills, connected with a railroad, were erected a few years ago by the late Sir John Caldwell, but from the diminished demand for deals and other timber in Great Britain, at present they are not in operation.

Returning to Woodstock, a little notice may be taken of the streams on the east side of the Saint John, between that place and the falls, including an account of the Tobique River.

Directly opposite the village of Wakefield, there is a small stream called the Pecagogmik. At its mouth there are excellent mills. The soil along its course is good, and there is some intervalle upon the borders of the stream. A short distance from the river the lands are ungranted.

The Shictahuk, Monquart and Muinec are small streams flowing in from the northeast, taking their rise near the sources of the South West Miramichi. These rivers descend from the mountain range already noticed, and are scarcely navigable for canoes.

Between these rivers and the South West Miramichi, and also eastward of Pecagogmik, there are tracts of ungranted land, containing several hundred thousand acres. We had been informed that the lands on the east side of the Saint John were not so well adapted to agriculture as those of the western side of the river; but upon a careful examination of the soils, taken from different places, and an attentive inquiry into the nature of both districts, no good reasons for such an opinion were observed.

The whole of the country intersected by the Saint John, between the Meductic and the Grand Falls, and even into the Madawaska settlement, consists chiefly of grauwacke, calcareous slate, and limestone. The soil itself is the result of the disintegration and decomposition of these rocks, and therefore it contains a considerable quantity of lime. The argillaceous matter contained in this soil gives it a peculiar muddy appearance, and it resembles recent alluvium. This variety of soil was found to be predominant throughout the above tracts, and wherever it has been cultivated it has proved to be fertile. The same kind of land extends across the Province, following the course of strata of rocks to the Restigouche, where it possesses similar characters.

Between the main North West Miramichi and the Saint John, there is a sufficient quantity of excellent soil for at least two thousand farms. Beech, sugar-maple and birch generally occupy the higher grounds; hemlock, pine, spruce and cedar abound on the slopes and in the valleys. The mixed growth, so frequently preferred by settlers, holds an intermediate place between the high and low lands. Even here there are patches of intervalle bearing natural grass, and experience has proved

that the lands pronounced to be wet before they are cleared, and before the rays of the sun are let down upon the earth, most frequently prove to be the best lands for potatoes and hay. I am not aware that this fine tract is within the limits of any County, or that it has been surveyed or divided into Parishes. Along the base of the mountain range already mentioned, the scenery is remarkably picturesque, and before this branch of the Alleghany chain entirely subsides, it throws up some lofty cones, thereby adding much to the natural beauty of the country. The whole surface is abundantly watered. At some future day a road will be evidently opened between Boiestown on the Miramichi and the Grand Falls, crossing the Tobique in the direction of the Otelloch, where there is a wide opening between the hills.

TOBIQUE RIVER.

The Tobique is the largest tributary of the Saint John, excepting only the Aroostook, which it very nearly equals in size. Its mouth is twenty miles below the Grand Falls and two miles below the confluence of the Aroostook with the main stream.

The direction of this river is to the northeast, and about eighty miles from its mouth following the courses of the stream, it is divided into four branches. One of these branches enters from the southeast, and proceeds from three lakes, the largest of which is about twelve miles in length. These lakes are situated at the principal sources of the Miramichi. The old Indian portage, between the Saint John and the Miramichi waters, is only one mile in length. The other branches extend to the northward, and meet the sources of the Nepisiguit and Upsalquitch, whose waters descend into the Bay Chaleur.

All these rivers take their rise in one district, and in that chain of mountains which crosses the American frontier, and finally disappears between the Saint John and the Gulph of St. Lawrence. Blue Mountains, Ox Mountain, Pot Mountain, and others in this termination of the range, exceed two thousand feet in height, and the highland district around them affords the most sublime scenery in the Province. The summits of these mountains are generally naked, and from some of the

narrow ravines on their northern sides where the rays of the sun seldom penetrate, the snow scarcely disappears during the whole season.

The streams pass through narrow and tortuous channels, frequently overhung with stupendous cliffs, and the water dashes from fall to fall until it reaches the plains below. This part of the Province is almost unknown even to the lumbermen, and the existence of the beaver is an evidence that even the Indians seldom penetrate so far into the forest. In this part of New-Brunswick, there is a tract of country three hundred miles in circumference that still remains an unbroken wilderness. The chief part of this area is capable of cultivation, and it contains large tracts of superior soil. The whole surface is well watered, the rivers abound in fish, and offer facilities for internal communication.

As the Tobique River and its tributaries are uninhabited, a sufficient stock of provisions was procured, and three Indians, each with a light bark canoe, were hired for the expedition. Accompanied by Mr. James Millidge, a volunteer, and my son, the ascent of the river was commenced. We started from Fredericton on the 27th of June and reached the mouth of the Tobique with the canoes, instruments, and baggage, on the 3d of July, exploring the left bank of the Saint John on our way.

At the mouth of the Tobique, there is a considerable tract of terraced intervale, which, with several thousand acres of excellent upland, belong to the Melicete Indians. The Islands in the mouth of the stream are very productive. There is here an Indian village of twenty-six houses, a chapel and two hundred souls. This place is a depot for timber, and upwards of three hundred men were employed in preparing the rafts to descend the main Saint John.

The Indians obtain a scanty subsistence by cultivating a small quantity of land, rafting timber, fishing and hunting. Ambrose Bear and Lewis Bear, two brothers, were in possession of furs to the amount of £150. Among these were eighty beaver skins, and thirty pounds of castor.

The Indian lands at this place occupy an important situation, being at the mouth of an extensive river. As the Melicetes do not cultivate their land, it would be advantageous to this part of the country if an exchange could be made with them,

whereby they might enjoy an equal number of privileges, and their present tract be opened by improvements; but great care should be taken that the property of these people should be rendered permanent, and not be placed at their own disposal.

One mile above the Indian Village there is a dangerous rapid, called the Narrows. The river at this place passes through a gorge a mile long, and upon an average only one hundred and fifty feet wide, and between perpendicular cliffs from fifty to one hundred feet high. Through this gorge the water rushes with great violence, and the projecting masses of rock produce violent whirlpools, so that, in times of freshet, canoes cannot pass, and rafts of timber are frequently broken up. The gorge is too narrow to vent the water from above; it therefore rises and rushes through the narrow channel with frightful impetuosity. We were obliged to draw our canoes up this rapid with tow-lines. In descending, the Indians were anxious to "shoot the rapid," as it is called, and we were carried through the opening with almost inconceivable swiftness.

The navigation of the river at this place might be greatly improved, and rendered safe, by the erection of dams and locks. It is an excellent site for mills, which might be built without being any great injury to the salmon fishery. There was once a fall at this place, which will be noticed in the geological part of the report.

Four miles above the narrows, a small stream enters from the west bank of the Tobique, called the Pokiok. It has a fall at its mouth, and is occupied by saw mills. From the Pokiok to the Red Rapids the distance is seven miles; the stream here runs at a moderate rate, and large boats may be towed up by horses. There are here several small islands and patches of intervalle. The banks of the stream are high, and covered with a mixed growth of hard wood and hemlock. On this part of the river we observed red and white clover, wild roses, onions, peas, wild plums, currants, and gooseberries; also, balsamic poplar, high cranberry, butternut, and thorn, with a great variety of other indigenous plants. The soil is good, and the surface is well watered. Several squatters have settled upon the banks of this part of the stream.

At the Red Rapids, the river, by passing over a ledge of shelving rocks, is again broken: it would, however, be navi-

gable for tow-boats, if a part of the broken dam on the east side of the stream was removed.

In 1837, the Tobique Mill Company built a dam across the river, and erected extensive saw mills; but before the mills were put in operation, a part of the dam was carried away. The mills have since been taken down, with the intention of moving them to the "Narrows" below.—£27,000 were expended at this place.—3,000,000 of logs that had been cut have also been lost in this speculation; and the establishment now appears like a deserted village. If a dam should be erected across any part of the Tobique, a free passage for salmon and other kinds of fish should be secured, as there is scarcely a better fishery in the Province than this river affords.

It was intended that the road between Fredericton and the Grand Falls, known as the Royal Road, should cross the Tobique at this point, and a large sum of money was expended in opening a line from Red Rapids to Fredericton. But a quick growth of underbrush is now fast filling it up, and from a series of objections to the whole line, it will probably be abandoned. The lands here are of a good quality.

On the 5th day of July while we were at the above place, we witnessed a most violent tornado. A small cloud rose quickly from the west, and soon spread itself so as to produce almost total darkness. The lightning began to dart from the clouds, and sharp peals of thunder rattled along the valley, accompanied with a shower of pieces of ice as large as musket balls. Fortunately for us we procured a shelter in a clearing, and secured the canoes. The shower of ice lasted only five minutes, when it passed by, and was followed by the blast of a hurricane and whirlwind, which tore up the trees from their roots, and levelled the lofty forest to the ground. The width of the tornado was not to exceed half a mile, and it followed along the wilderness to the east, leaving an open space of fallen trees wherever it went. Hurricanes of this description are extremely rare in the Province.

The distance between the Red Rapids and the Wapaskagan, following the courses of the Tobique, is about twenty miles. In this distance the Otelloch and Ottella and three brooks enter the river. The largest of these is the Otelloch or Hotelle, signifying brook in the Indian language. This tribu-

tary extends in an easterly direction, and through some good intervale and upland. The main river is here extremely beautiful, and contains a number of Islands of intervale. It is also skirted with deep and rich alluviums, covered with elms and a luxuriant growth of wild grass and other plants.

The rocks are bright red sandstones and red marls, which, in almost every part of the world, support a strong and productive soil. The uplands in general are level and well watered, and the banks on each side of the river slope gradually down to the water.

The Wapskanegan is a stream of considerable size. At its mouth there is a perpendicular cliff sixty feet high. The Indian name of the river is *Aw-kec-aw-waps-ka-nee-gan*, which signifies a river with a wall at its mouth. The lumbermen call it the *Wapske*. This stream also runs through some good intervale and upland, and is navigable for canoes twenty miles. It approaches one of the branches of the Miramichi, into which a canal might be opened for a moderate sum. Along this stream gypsum and limestone might be transported down the Miramichi, where they have not yet been discovered.

At Plaster Island, two miles above the Wapskanegan, also on the banks of that stream, and so far as we could discover in a district comprising several thousand acres, there are inexhaustible deposits of excellent gypsum. At the Island on the left bank of the Tobique, the gypsum occurs interstratified with red marl and sandstone in a cliff one hundred and thirty-five feet high. This plaster has already been transported on sleds to the Saint John, where it has been applied as a manure to great advantage. The crops of wheat have been greatly improved by its use. It is of the compact and fibrous varieties, and some of the gypsum is of a brick red colour.

About a mile farther up the stream, I discovered a ridge of limestone, which probably crosses the river. This limestone is stalactical, like that found in the interior of caves. Apparently the river has broken into a cave at this place, as the stalactites are found scattered along the shore. From the deep chasms and fissures concealed beneath fallen trees and other vegetable rubbish, it is dangerous to walk over this rock, and it is probable that the earth is cavernous beneath.

Above Plaster Island the river becomes very serpentine,

and its banks are elevated from fifty to a hundred feet in height. The stream, although it runs at the rate of seven miles an hour, passes smoothly along. There are a number of places where all our strength was required to force the loaded canoes up the river. These are called by the Indians "quick waters." The stream however does not break, as in the ordinary rapids, where it passes over an uneven surface, and large tow boats may ascend it without difficulty.

About thirteen miles above the mouth of the Wapiskane-gan, there is another large stream called the Agulquac, which enters from the east. Between the mouths of these two tributaries, there are Long Island, Diamond Island, and others, consisting altogether of rich alluviums, covered with elms and balsamic poplars. There are also fine intervalles on each side of the river. At one of these Islands we were deserted by one of our Indians. The intense heat of the weather and the stings of the mosquito and black fly were almost intolerable, and required a little more fortitude than is possessed even by the natives themselves. It should, notwithstanding, be remarked, that these insects are not so troublesome where the country is cleared.

All the uplands in this quarter are of an excellent quality. Sisson Ridge, a short distance above Long Island, is an extensive forest of sugar maple, yellow birch, &c. The soil is a dark coloured loam, and will equal in fertility any upon the banks of the Saint John. Brooks and springs of water are abundant.

The river here will average eighty yards in width, and is less rapid than it is farther towards its mouth.

The Agulquac is a muddy stream at its mouth; it enters the Tobique from the eastward, and it is navigable for canoes about twenty-five miles. It nearly meets the Little South West Miramichi. This stream also passes through a fine tract of country and strips of intervalle. A large area in this district was overrun with fires a few years ago. It is probable that this was the same conflagration that destroyed the towns and villages of Miramichi in October, 1825; but as there are no inhabitants in this quarter, the exact period of its occurrence has not been ascertained. The dreary appearance of this part of the country has been produced by fire, which reduces the bright green forest to a lifeless waste. It is from the desolation

thus produced that the lumbermen have supposed that the soil is barren. Upon examination, we found that the tract thus overrun consists of superior land, and the large half-burnt fallen trees upon its surface are evidences of its efficiency. The forest is sometimes fired by lightning. The Indians are careful to extinguish their fires when the season is dry, knowing that a conflagration in the woods destroys the game, and sometimes the people of their own tribe.

We here observed that our map of this part of the country was exceedingly incorrect. It is certainly desirable that a correct survey should be made of the Tobique and its tributaries.

Four miles above the mouth of the Agulquac, there is a place called by the Indians *Che-aa-qua-as-cook*, which signifies "Big Jam." The lumbermen call the same place "Graball Island." From the peculiar direction of the current, a small island arrests the progress of all the floating timber, and a "jam" is produced.

A sudden turn in the river is called Blue Mountain Bend. The stream is here about seventy-five yards in width, and the intervalles are covered with a lofty and thick foliage. The river passes along the base of Blue Mountain, a beautiful eminence, running up to a sharp point. This mountain is nearly two thousand feet high. On its river side there are perpendicular cliffs, and a large brook descends through a deep narrow chasm at its southern base. The whole country, from this eminence to the mouth of the Tobique, is comparatively level; but from this point, northward, it assumes new features, and becomes elevated.

Still proceeding northward, the character of the river, with its intervalles and islands, remains unchanged, and its beauty is increased by the lofty hills seen in the distance. All the lands are fit for cultivation, and many tracts are of a superior quality. Along the whole course of the stream there are excellent alluvial soils, covered with the elm, balsamic poplar, ash, alder, &c.; wild hay is abundant. Besides these, we found indigenous grapes, wild plums, currants, gooseberries, mint, rhubarb, and wild onions, with all those plants that only flourish on the richest soils.

It has been already stated, that at the distance of about eighty miles along the course of the river, the Tobique is divi-

ded into four branches. The Little Tobique, Mammoackel, called by the Indians, *Epee-cus-cus-sis*, (brook.) The left hand branch, and the right hand branch, known in the Melicete language by the name of *Qua-quops*, or dirty brook. There are extensive intervalles where these streams meet, and the country around them possesses every advantage for settlement. About five miles up the right hand branch there is a fall of six feet. The Little Tobique continues its course to the northward, and finally meets a lake at the head of the Nepisiguit. The streams which descend from the lakes situated to the northeast, are blocked up with fallen cedars and "jams" of trees, and one of them is so much broken by falls and rapids as to render its navigation impracticable.

The country still further northward becomes exceedingly mountainous and broken. There are lofty ridges of rock, and fields of granitic boulders, which the industry of man can never render fertile, nor the art of agriculture improve. It is among these mountains, far in the interior, that the harmless native wild animals of the country still find a retreat, and the beaver lives safely within his dwelling.

The extreme sources of the Tobique wind their way among naked and almost inaccessible mountains. Bald Mountain is 2240 feet high, and is surrounded by several lofty peaks, but little inferior in altitude. It was my intention to have visited all these mountains, but the streams had become too dry for canoes, already shattered in the rapids—one of our Indians had deserted, and those who remained refused to proceed any farther into the wilderness. Our stock of provisions was also much reduced, and our faces and limbs were swollen from the incessant stings of the black fly and the musquito.

The whole surface of the country, in the direction of the Tobique River, from its mouth to the distance of eighty miles northward, is capable of the highest degree of cultivation: the soil is equal to, and sometimes surpasses, the best kinds I have seen in the Provinces.

Formerly there were immense groves of white and red pine in the vicinity of this stream, but most of these have been removed or destroyed by fires. At present there is, comparatively, but a small quantity of pine. Spruce, cedar, larch, and hemlock are abundant, and there are fine groves of beech, birch, and maple.

In descending the river I counted seventy islands, all composed of alluviums. The limestone, gypsum, and salt are very valuable in this part of the Province, and they are so situated that they may be transported over a wide extent of country, at a trifling expense. The river abounds in salmon, during their season, and there is always a plentiful supply of the finest trout, and other kinds of fish, in its waters. John Cahil, who lives near the mouth of the river, killed twelve barrels of salmon with a single spear, last season: they were sold for £5 per barrel. This fishery should be protected by law, as the drawing of nets across the stream, prevents the fish from ascending to deposit their ova, and will finally destroy a valuable privilege of the settler.

The Tobique is navigable for canoes and tow-boats about one hundred miles from its mouth. There is only a portage of two miles between its head waters and the Nepisiguit, and one of three miles to the Upsalquitch. The lands upon the Tobique remain ungranted.

Under a due consideration of all the advantages offered by the river, and the soil of the uplands and intervalles, I am fully of the opinion that this tract of country, which embraces several millions of acres, is better adapted to the circumstances of a respectable class of emigrants and settlers, than any district I have seen in New-Brunswick or Nova-Scotia.

It would be impossible to form a correct opinion in regard to the climate of the valley of the Tobique country, without having more experience of it than a single exploration would afford. From the nature of the plants and their luxuriance, it may be believed that the climate is milder there than it is nearer the coast. From the 5th to the 20th of July, the average of the thermometer was from 90° to 95° fahrenheit, in the middle of the day; and frequently the mercury would rise to 100° in the shade. There is a great change of temperature in the forest during the night, when the mercury will often fall to 50° and 45° . I observed, for the first time, that black flies and mosquitoes cease to sting when the thermometer is at 95° , and also when it is at 55° . Extreme heat as well as cold compels them to retreat.— 75° may be called the best biting point of these insects.

The inquiry has been already made, by what means could

a family be removed to the Tobique, or any part of the upper country? Between Saint John and Fredericton, there is a steamboat daily in the summer season, and it is probable that steamboats will soon ascend to Woodstock. But at present families and baggage are removed at a moderate charge in the tow-boats plying on the river as far up as the Grand Falls, which are twenty miles above the mouth of the Tobique. These boats may also ascend the Tobique in the summer season, or canoes may be procured at the mouth of the river. The opening of roads into the interior of this new country would greatly facilitate its settlement. It may not be deemed expedient, nevertheless, to make roads until settlers have first advanced and taken up their lands.

EXPLORATION OF THE RESTIGOUCHE RIVER.

In pursuing the exploration of the Restigouche, my examinations were commenced at Bathurst, in the County of Gloucester, and extended along the coast of the Bay Chaleur to the river. It has, therefore, been deemed proper to give some account of the topography of the district between Bathurst and Dalhousie; notwithstanding, such an account must remain imperfect, in some degree, until the whole of the Counties of Restigouche and Gloucester are examined.

The Counties of Restigouche and Gloucester, from bordering on the Bay Chaleur, possess great advantages in regard to navigation, and from the great supply of timber still growing on the unsettled tracts, and the fisheries along the shores, these Counties are capable of supporting an extensive trade.

Bathurst Bay and the Restigouche are two spacious harbours. The largest rivers flow into them, and thereby they can maintain a free communication with the interior. Although Campbelltown, Dalhousie, and Bathurst are but small towns, they have within a few years grown to be places of considerable importance, in consequence of the number of ships built and employed in the timber trade.

During the past year the trade in North American timber has declined, and it is to other resources the inhabitants of those Counties, and of the whole Province, must now direct

their attention, in order to secure an enduring course of prosperity. A great number of villages have sprung up in a short space of time; these would languish, if the soil, the minerals, and the fisheries did not offer an enterprising and industrious population the elements of prosperity and contentment. Only a small proportion of the lands in these Counties have been granted, and a still less quantity is improved. Any inquiry, therefore, whose object is to bring these resources into operation cannot be considered useless.

The distance between Bathurst and Dalhousie is about sixty miles. The lands along the shore are comparatively level, being seldom elevated more than fifty feet above the sea. The coast is indented with numerous creeks and coves, and a number of small rivers open into the Bay. In the interior, the country is more mountainous and broken, but from never having been explored in reference to its soil and natural productions, little is known of the prospects it offers for settlement.

The whole coast abounds in limestone and marl,—the latter was discovered at a number of places, and its situations were carefully pointed out to the inhabitants, who will immediately employ it in fertilizing their lands. The marl may be advantageously used by forming it into composts with the marine plants or drift sea-weeds, of which there are vast supplies on the shore. These minerals are of great importance to the agriculture of the district, where a spirit to improve the state of husbandry exists that would be creditable to older countries.

The lands in the neighbourhood of Bathurst are in general productive, and agriculture has advanced rapidly in the County of Gloucester during the last few years. Francis Ferguson, Esquire, has eighty acres of land under cultivation. This gentleman forms composts chiefly of lime and peat, and raises abundant crops of wheat. Francis Fraser, Esquire, has also a large and well cultivated farm. These gentlemen, and others in the town of Bathurst have done much to improve the agriculture of this part of the country.

I have not had an opportunity to examine the wild lands southward of the settlements, but from the best information received, they are very fertile.

Proceeding along the shore to Dalhousie the next large

settlement is *Petit Roche*, consisting of two hundred families of French Acadians, whose ancestors fled from Nova-Scotia during its early troubles. The farms and buildings of these people are small, and lack that neatness sometimes seen in French villages. The two-fold objects of farming and fishing, pursued by these people, are sufficient to account for their slow advancement.

There is an abundant supply of limestone in this village. The inhabitants have begun to apply lime to their lands, and to ship small cargoes to Prince Edward Island. Their kilns are small, and very imperfect in their construction. The directions for building kilns and burning lime contained in the appendix are recommended to their attentive consideration.

At Belle Dune Point, there are also inexhaustible deposits of limestone and marl. Of the latter there is a very valuable bed on the farm of Mr. James Galbraith. The stratum is two feet in thickness. It is situated beneath four feet of peat and decayed roots of trees, and occupies a tract of forty acres. I received a small quantity of this marl from Thomas M. Deblois, Esquire, of Bathurst, last season, and having submitted it to a careful analysis, returned him the result. It has since been applied by Mr. Galbraith to a field sowed with wheat, and I had an opportunity of observing the improvement in the crop by its use. This simple discovery has led to the most beneficial results. Marl has been found in other places, and will hereafter be extensively employed in this part of the Province.

This marl is of a yellowish white colour, and strongly resembles chalk. It is almost a pure carbonate of lime, and is therefore very powerful. I had formerly discovered the same variety of marl in Nova-Scotia. A similar kind has also been found near Dalhousie. In each of these instances the marl bed has been the site of a fresh-water lake—a circumstance fully proved by the abundance of fresh-water shells contained in each stratum.

It has been already remarked that marl was not employed in the Province previous to the commencement of the Geological Survey. Its discovery and application alone, will render a tenfold equivalent to the country for all the expense of the undertaking.

In the vicinity of Belle Dune Point, there are some fine

groves of birch and other kinds of hard wood: cedar and spruce are common. The lands in general are stony, but the soil is strong and productive.

The next stream of any importance is Jacquet River. It takes its rise among the mountains already described, and opens into the Bay, about nine miles from Belle Dune. It is a rapid stream, and is scarcely navigable for canoes. The lands near its mouth are of a good quality, and a short distance from the shore they are still ungranted. The chief part of the pine timber that formerly grew along its borders has been removed.

On the north side of the mouth of this river, and extending towards Nash's Creek, I discovered a thick bed of excellent blue marl. This marl bed is eight feet in thickness, and, from the abundance of marine shells contained in it, the inhabitants had given it the name of the *clam bed*. It is of a light blue colour, and contains the carbonates of lime and potash. The application of this substance to lands in its neighbourhood will greatly improve their fertility. The inhabitants were made acquainted with its situation, and have already begun to remove it for use in the ensuing season.

This part of the shore is but thinly inhabited. The population consists of Provincials, Scotch, Irish, and French Acadians, who appear to live together in great harmony. Notwithstanding the settlements are only in their infancy, the inhabitants have cleared some fine fields, and since their attention has been directed to husbandry they have been rewarded with good crops. It is very desirable that the road between Bathurst and Dalhousie should be completed, and a bridge is required over the Jacquet River. A bar of sand at this place is almost as great an impediment to travelling as the narrow paths and causeways running along the very margin of the sea, or the collections of sand thrown up in imitation of turnpikes.

At Nash's Creek, there is a small settlement a mile and a half from the shore. From this place to Dalhousie the distance is nineteen miles. In approaching the Restigouche, the soil improves in quality.

Benjamin River, North and South Rivers Charlo are small rapid streams, being chiefly useful in affording easy passages for timber procured in the interior. At the bridge over the

North River Charlo, I discovered another bed of excellent marl. It will be seen in the bank just above the bridge, where it has been exposed by the stream.

Across the mouth of Eel River, the sea has thrown up a bank of sand a mile long, and thus offered a site for a road, which has been duly improved. A bridge has been erected to connect this bar of sand with the opposite side of the river. The remainder of the distance to Dalhousie is four miles. The road passes over three sharp ridges of trap rock and some very steep hills.

Eel River is a long narrow stream. It commences near the Nepisiguit, and runs through a fine level district of fertile land. There is here a large tract of superior soil, almost surrounded by mountains. The Colebrooke Settlement is situated upon this tract, six miles from the Restigouche. There are new settlements each side of the river near its mouth. A great quantity of these lands remains ungranted, and there are few localities where a respectable class of settlers would meet with greater encouragement.

The shores between Bathurst and Dalhousie afford excellent fisheries for cod, pollock, haddock, halibut, herring, salmon, sea trout, and other kinds of fish. Capelin are so numerous in the early part of summer, that they are taken in immense quantities, and spread upon the soil for manure. The practice of manuring land with fish is common along the whole of the north shore of New-Brunswick, and in the District of Gaspé. Experience has proved that this kind of manure, although it gives a good crop for a single season, is ultimately injurious to the land, which becomes sterile as soon as this dressing is discontinued. This great destruction of small fish reduces the quantity of food intended for the larger ones, and, if continued, will destroy the fishery altogether. Providence never intended that any of her gifts should be thus abused, and in a country where limestone and marl are abundant, the practice is inexcusable. The fisheries on this coast should be protected by law.

Seals are numerous in the Bay Chaleur, and they are frequently seen in considerable numbers along the coast. They were taken by the early inhabitants of New-Brunswick, who carried on a considerable trade in seal skins and oil. At present the seal fishery is not attended to.

The Bay also abounds in various kinds of wild ducks and geese,—of the latter, flocks, containing several thousands, were seen feeding on the shore.

The principal sources of the Restigouche are situated in a mountainous range that extends through the whole District of Gaspé. The course of the river, from its mouth to the distance of sixty miles, is to the southwest; it then turns at a right angle to the northwest. Extending towards the Saint Lawrence, one of its branches reaches to within a short distance of the Metis Lake, and another approaches Lake Tamisquata, on the portage between the Saint John and Quebec. Another large branch extends to the southwest and nearly meets the streams that flow into the Saint John. The whole length of the river is estimated to be two hundred miles.

The Bay Chaleur having extended deeply into the country, finally terminates in this fine river, which opens a wide district to all the advantages of trade and internal communication. The banks of the Restigouche are not settled more than thirty miles above its mouth. The upper part of the stream and all its branches pass through a dense wilderness.

The Upsalquitch, another large tributary, descends from the southward, where it meets the heads of the Tobique and Nepisiguit, which are also uninhabited.

It was up to that branch of the Alleghany which extends throughout the District of Gaspé, that the American Government laid their claims before the question of disputed territory was settled, and, until that period, the Restigouche formed a temporary boundary between New-Brunswick and Canada. But since the termination of that dispute, the range of mountains separating the rivers that flow into the Saint Lawrence from those that fall into the Bay Chaleur, the Restigouche and Saint John, will form the best divisional line between the Provinces. Such a line would give to each Province all the rivers that flow and open into their respective districts, and would agree with the physical geography of the country.

The Restigouche and its branches pass through a tract of country differing in its principal features from any other part of the Province. This part of New-Brunswick may be called Alpine, its scenery being varied with lofty hills and deep valleys. Mountain after mountain is seen rising in the distance,

and the horizon is indented with lofty cones of surpassing grandeur. It is only along the shores of New-Brunswick and Canada that any settlements have been made; a short distance from the coast, on each side of the Bay Chaleur, the country remains unexplored and unknown. It nevertheless appears, from accounts received from the Indian hunters, that even among those mountains there are large areas of table lands, capable of being extensively cultivated. These are the great reserves of territory destined to receive the redundant population of the Mother Country, at some future period.

The town of Dalhousie is situated at the base of a high ridge of trap rock, on the south side of the mouth of the Restigouche River, which at this place is three miles wide. It contains one hundred buildings, with wharves and large timber ponds. The mountainous character of the country on the opposite side of the river, the wide bay above the town, terminating in the deep valley of the Restigouche, render the scenery very bold and picturesque. The harbour is very spacious, and sufficiently deep for the largest ships of the navy.

During the last few years, an extensive timber trade has been carried on from this port. The supplies of provisions are chiefly received from Quebec. Since the recent decline in the price of timber and ships, the cultivation of the soil begins to form a part of the occupation of the inhabitants. I am indebted to Mr. Joseph Hunter, of this place, for information respecting the lands and the river above.

Campbelltown is situated sixteen miles above Dalhousie. The lands on each side of the river are high, and frequently broken and rocky. There is, nevertheless, a narrow flat of good soil along the edge of the river, which still continues wide and navigable for ships of the largest class.

Point Le Guard and Battery Point, on the Gaspé side, are bold promontories; they were the sites of batteries erected by the French, in their early struggles to possess the country.—The ancient clearings and breastworks are now covered with trees. Several large pieces of ordnance have been seen in the sand of the beach. Muskets, pistols, and swords have also been dug up from the old fortresses.

About a mile and a half above the town, there is a lofty hill called the Sugar Loaf. The side fronting the river is a

perpendicular cliff, with a slope *debris* at its base. The hill is in the form of a cone. The perpendicular cliffs and collections of enormous boulders, rendered our ascent from the western side difficult and dangerous. Visitors are recommended to climb the hill on its east side. It has been stated by some that the Sugar Loaf is inaccessible at the point where we gained its summit; and we can assure those who have written upon the subject, that such an opinion may be considered correct. From its top, the mountain appears to rise from the valley like a lofty tower, and those who are not accustomed to ascend heights not relieved by descending angles, will experience the giddiness felt on the tops of steeples and towers. The apparent altitude of this eminence is much reduced because it rises from a valley surrounded by hills. The Tracadegash, and other mountains of Gaspé, are seen rising into the air in great grandeur, and the whole country, to the north, is covered with majestic cones. The Bay Chaleur and Restigouche, with their infant towns, fill up the scenery below. To the south there is a wide area of table land, covered with a living mantle of evergreens.

The Sugar Loaf is three miles in circumference, and, according to the measurement taken by Sir Howard Douglas' reflecting circle, it is 844 feet high.

About three miles above Campbelltown there is a large estate belonging to Robert Ferguson, Esquire, one of the first settlers on the Restigouche. His establishment is situated upon a tract containing two hundred acres of intervalle, the chief part of which is under cultivation. The example and industry of this gentleman, and a few others, have mainly contributed to the improvement of this part of the country. The river is navigable for ships two miles above this place.

The lands on the Gaspé side of the Restigouche are high and broken. The river is skirted with a few level tracts, and small quantities of marsh alluviums.

The largest of these level tracts is Mission Point, the ancient residence of the Missionary to the Micmac Indians. It contains upwards of one thousand acres of good land, being situated upon a coal field, to be noticed hereafter. The Point belongs to the Indians,—two hundred families of whom are settled upon it. They have a large Chapel and Mission House, and small parcels of land under cultivation.

Point au Bourdo, the residence of Thomas Busted, Esquire, about three miles above the Mission Point, was once the site of a French town called Petit Rochelle, and the shores on each side of the river were formerly occupied by French villages.

The mouth of the Restigouche affords an interesting subject in the history of the Province, having been settled by the early adventurers into New-Brunswick. It was the interest of the first *habitants* to associate with the aborigines of the country; their muskets and swords are now found in the earth with the stone tomahawks and spears of the Indians; and their bones are mingled in one common grave.

In 1770 the French Government made an attempt to regain Quebec, and to strengthen their forces in Canada. A number of store-ships, under a strong convoy, were sent out from France, and reached the Gulph of Saint Lawrence, when information was received that a British squadron had preceded them up the river. Upon the receipt of this intelligence, the Commander of the French fleet took shelter in the Bay Chaleur, where he was followed by Captain Byron, the Commanding Officer of the British ships at Louisburg. The British squadron consisted of the *Fame*, *Dorsetshire*, *Achilles*, *Scarborough*, and *Repulse*. In proceeding up Gaspé Bay, the French ship *La Catharine* was captured, and another vessel was taken near *Caraquet*.

The French Commander, finding he was pursued, took shelter in the Restigouche River, under the batteries of Battery Point and Point Le Guard. His fleet consisted of the *Marchault*, 32 guns, *Esperance*, 30, *Bienfaisant*, 22, the *Marquis de Malose*, of 18 guns, and several sail of small privateers.

Captain Byron, with much difficulty, worked his ships up the river to the batteries, which were soon silenced. A general engagement then took place. The French fought bravely, until Monsieur Bourdo, the Captain of the *Marchault*, was killed, and a powder vessel blew up. Almost all the French vessels were either taken or sunk. The few that escaped were afterwards captured near Port Daniel. The town of Petit Rochelle and all the forts were destroyed. The remains of two French vessels may still be seen at low water near Mission Point, where several pieces of cannon remain partially buried in the sand. Near one of the ancient batteries, one of the guns was recover-

ed by Robert Ferguson, Esquire, and it is now mounted near his residence. It is a long French eighteen pounder.

At the site of Petit Rochelle or Point au Bourdo, now owned by Mr. Busteed, muskets, swords, bomb-shells, with a variety of other warlike instruments have been dug up, and among the ruins of the town, china, silver forks and spoons, and other articles of luxury have been discovered. The walls, cellars, and foundations of houses may still be traced where, like many other towns, Petit Rochelle was sacrificed to secure the country to the British Crown.

The entrance of the Metis or Kempt Road is about a mile above the Point, and twenty-four miles above Dalhousie. This road was intended to reach across the District of Gaspé from the Restigouche to the Saint Lawrence. It has never been opened to any great extent, notwithstanding it is the only land communication between Gaspé and Quebec. A mail passes here once a week. The mail carrier rides on horseback about sixty miles from the Restigouche to the Matapediac Lakes, where he feeds his horse on wild hay; he then walks upwards of forty miles to the mouth of the Metis River. This country is uninhabited, and the line of road runs through a mountainous and broken tract of country.

The most direct route for the Great Road from Gaspé and the Restigouche to Quebec, is from the Matapediac River to Tamisquata Lake, where it would meet the road from Fredericton to the Saint Lawrence. This line would be seventy miles shorter than the present route to the capital of Canada.

The opening of a road from Fredericton to some part of the Restigouche is a matter of much importance to the Province.

The tide flows about six miles above Campbelltown, and immediately above the mouth of Little River, the Restigouche becomes more narrow, and is studded with upwards of twenty small but beautiful Islands. The current is rapid and the water is remarkably limpid.

The Flat Lands are ten miles above Campbelltown. At this place the settlements on the river may be said to terminate, notwithstanding there are a few families scattered along the banks of the stream still farther up. At the Flat Lands there are five hundred acres of excellent terraced intervalle, similar to that in the neighbourhood of Woodstock. The soil also,

from being derived from calcareous rocks, resembles the mellow covering of Carleton. Limestone is also abundant.

Among the most lofty eminences on the side of the river is Ben Lomond, a mass of trap rock eleven hundred and forty feet high. The lands are covered with ridges of hard-wood and cedar swamps; and, notwithstanding the surface of the earth is so much broken by hills or mountains, the soil, wherever it is sufficiently deep for cultivation, is remarkably fertile. The river runs along a narrow channel, and between high cliffs of calcareous slate and limestone, and the whole district surpasses, in the grandeur of its scenery, any of the southern parts of New-Brunswick.

There are a number of flourishing settlements on the Canada side of the Bay Chaleur and Restigouche, but the remoteness of the district from the seat of Government, and the want of a land communication to the Saint Lawrence, has retarded the advancement of its civil and moral institutions.

All the timber cut upon the tributaries of the Restigouche is shipped from Campbelltown and Dalhousie, on the New-Brunswick side. The range of mountains separating the rivers that flow into the Saint Lawrence from those that fall into the Restigouche and Saint John, would be, in my opinion, the best divisional line between Canada and New-Brunswick. Such a line would give to each Province all the rivers that flow into their respective districts, and would agree with the physical geography of the country.

About two miles above the Flat Lands, a large stream enters the Restigouche called the Matapediac. It takes its rise from Lakes on the Saint Lawrence side of Gaspé, and descends through a chain of mountains and between perpendicular cliffs of rock; its principal branches are the *Us-men-ta-qua-gum*, *Ca-sops-coult*, and *Me-la-ga-na-took*. Tow boats may be drawn up the Matapediac fifty miles. There is but little intervalle on the sides of the stream, and the whole district is broken by high hills and deep ravines. There is, notwithstanding, a good supply of pine timber in this quarter.

Six miles above the mouth of the above stream, the Upsalquitch enters the Restigouche from the New-Brunswick side. It proceeds from the mountains at the heads of the Tobique and Nepisiguit, being a very rapid stream with numerous branches.

Its tributaries also run between perpendicular cliffs, which greatly increase the danger and difficulty of procuring the pine timber still remaining along the borders.

From the Upsalquitch to the mouth of the Patapediac, the distance is twenty-nine miles; eight miles above the mouth of the former stream, a ledge of rocks crosses the river and forms the "chain rock rapids." Still farther up the land has been overrun with fires, and the country has a peculiar gloomy appearance. The river will average sixteen rods in width, and passes through a deep channel cut through the mountains, and between cliffs of calcareous slate from fifty to one hundred and fifty feet in height.

The Patapediac is a stream of considerable size. It extends to the northwest, and it is said by the Indians that it approaches within a short distance of the Metis Lake.

The same general features that have been described prevail upwards to the mouth of a river called by the lumbermen the Tom Kedgwick, fifty miles above the mouth of the Upsalquitch. The lands here become less mountainous, and are fit for cultivation.

In order to explore the upper part of the Restigouche and Grand River, a tributary of the Saint John, my son ascended the latter stream, and having procured canoes and provisions, with a guide, he crossed from Grand River to the Restigouche.

Grand River is a quiet stream, navigable for canoes and rafts twenty miles. The large boulders at its mouth might be removed. It passes through a level tract of good land and narrow strips of intervale. After ascending the river twenty miles, and one of its branches called the Waagan, a portage was made of three miles to a branch of the Restigouche, also called the Waagan.

The portage path is across a ridge of land a hundred feet above the level of the sea. The country here was overrun by fire three years ago, and from the great number of fallen trees, there was much difficulty in transporting the canoes from one river to the other. This ridge divides the waters of the Saint John from those of the Restigouche, which nearly meet in a swamp in the neighbourhood of the portage. A canal might be opened between these two streams at a moderate expense.

The difficulties of descending from the sources of the river in the autumn are very considerable. We were compelled to drag our canoes nine miles along the bed of the stream. And so great is the difference of climate in the wilderness that ice was frozen half an inch in thickness on the upper part of the Restigouche, on the 12th September, while at the mouth of the river no frost had been seen, and luxuriant crops of wheat were in full harvest.

Between the Waagan or Hunter's Brook, on this branch of the Restigouche and the "Little Forks," the distance is about twelve miles. There are some alluviums on the side of the stream, from which the uplands rise gradually to a moderate height. At the "Forks," the river is eighty yards wide, and another branch of considerable size extends to the northward. The due north line of the Americans, according to their former claim, crosses the stream three miles below Hunter's Brook. It is run very correctly, and cleared of underbrush fourteen feet wide. Twenty-seven miles farther down the stream, this branch joins the main river. Five Finger Brook is also a large tributary on the New-Brunswick side, where there is a considerable quantity of intervale, and land fit for cultivation.

We were surprised to observe that the stream which has generally been understood to be the Restigouche, and is so called by the English inhabitants, is only a branch of the main river. The main river, on some of the maps, is called the Cadamkiswa, which the lumbermen who visit the place have changed into Madam Kedgewick or Tom Kedgewick. The Indian name in the Micmac language is the *Pee-tam-kedge-wee*. The southwesterly branch of the river above its junction with the larger stream is called by the Micmacs *A-waan-jeet*. The former stream is one-third larger than the latter, and is eighty yards wide where it meets its chief tributary.

The distance from the mouth of Grand River, along the *A-waan-jeet*, or south-west branch of the Restigouche, to its entrance, is one hundred and fifty miles. The Restigouche is navigable for tow-boats and rafts one hundred and twenty miles. The Matapediac is navigable fifty miles, and the Upsalquitch about seventy miles. All these streams are situated in an uninhabited and almost unexplored country. The district examined abounds in marl and limestone, and notwithstanding

the lands at the entrance of the main river are mountainous and broken, the soil in general is good, and produces excellent crops of all kinds of grain. When the extent and resources of this part of New-Brunswick are considered, it may appear surprising that it has so long remained in its present state. But it can never be supposed that any district will be settled so long as its natural advantages remain unknown.

PUBLIC LANDS.

The Province contains about 16,500,000 acres; of this quantity 12,000,000 acres are capable of immediate cultivation, and 1,000,000 may be reclaimed in a more advanced state of Agriculture. I have estimated that, including the great marshes of Wesmorland, only 440,000 acres are cleared.* By obtaining a credit of the Government for fifty acres of land, any person, with a family, having a capital of £12 Currency, (£9 12s. Sterling,) can maintain such family until the first crop is produced, and, with sobriety and industry, in six years they can pay for the land with the interest on the first purchase, and purchase fifty acres more on credit. The above may be performed in a less time than six years, but I have taken this period as a medium estimate.

The lands along the southern coast of the Province are in general much less fit for cultivation than those of the interior and northern shores. The settlers are also exposed to the dense fogs of the coast, but which seldom reach more than twenty miles from the seaboard. The soil, from being derived from granite and other hard rock, is more scanty along the southern coast, and it is frequently too stony to be extensively cultivated. There are, nevertheless, many small tracts of good upland, and some fine intervalles along the rivers and smaller streams.

Twenty miles from the southern seaboard the lands improve, and the whole northern side of the Province may be said to be capable of being tilled to advantage. The quality

* From official returns, 3,634,280 acres have been granted, and 13,792,272 remain at the disposal of the Crown.

of the soil, however, differs in different districts, and there are many extensive tracts of waste lands of a superior quality. The several Counties have been classed in regard to the lands they contain fit for immediate settlement, in the following order:—

Saint John.—There is but a very limited quantity of good ungranted land in this County. The lands eastward of Quaco, and those recently laid out between Quaco and Hammond River, are in general broken and stony, and the gravelly nature of the soil is seldom discovered until the land is cleared of its timber; there are but few intervalles* in this County.

King's County.—There is a large area of superior land for settlement southward of Sussex Vale, and at the head of the Mill Stream.

Westmorland.—In the County of Westmorland there still remain some fine ungranted tracts. They are chiefly situated at the heads of Pollet and Coverdale Rivers, and Turtle Creek, and also at the sources of the Washademoak. The soil in general is a sandy loam, and it is easily worked. There is some intervalle still ungranted.

Queen's.—In Queen's County there are a number of tracts of excellent ungranted land. There is a large tract between the Nerepis Road and Gagetown, including the Victoria Settlement. Also southward of the Nerepis Road, upon both sides of the Washademoak River, above Long's Creek, and between Salmon River and New Canaan Settlement. Some of these soils are a deep red loam. Limestone was found to be abundant on both sides of the Saint John: it will be seen at the farm of Mr. Merritt, and at the south entrance of the Washademoak.

Charlotte.—The best ungranted lands in this County were seen in the direction of the Magaguadavic River; and there are intervalles along the principal streams. The northern part of this County abounds in granite rocks. The lands in the Tryon Settlement are in general rocky, and a part of the soil is meagre.

* Alluvial flats adjacent to the rivers, which are annually overflowed, and yield abundant hay crops.

Sunbury.—Almost all the ungranted land in this County is of a good quality, and probably not more than one half of its surface is disposed of. There are some good intervalles.

York.—The best ungranted lands in this County are situated on the south-east side of the Nashwaak, and near the main South-West Miramichi and Texas River.

Carleton.—Almost all the lands in this County are of a superior quality. Between the Saint John and the Main South-West Miramichi, there is an immense tract of fertile soil, with belts of intervalle along the streams. Very extensive settlements might be opened in this quarter. Farther westward there is a mountainous ridge; even here there are some superior lands, and the scenery is truly Alpine. The Tobique River passes through a fine country for agriculture, where gypsum and limestone are abundant. The river is skirted with excellent intervalles. These lands are not granted, and offer every advantage for settlement. Near the banks of the Saint John, the Grand Falls, and at Grand River, the land is good, and limestone is plentifully scattered over the County.

Kent.—There are some good soils in this County, many of them are, however, light and sandy.

Northumberland.—The good land in this County is too extensive to require any particular description, and there is much intervalle along the streams.

Gloucester.—The above remark will apply to the north-eastern part of Gloucester. There are, nevertheless, some low and swampy grounds in this quarter.

Restigouche.—The lands near the mouth of the Restigouche are mountainous and broken. Southward of Dalhousie and Campbelltown there is a large tract of superior land; upon a part of this tract the Colebrooke Settlement is situated. There are good lands upon the upper part of the river. The interior of Gloucester and Restigouche Counties have not been explored.

There is another subject that requires some consideration. It is the manner of making surveys. It is not possible for any survey to be made correctly, where the variation of the Magnetic Needle is not attended to.

In a country where the variation is constantly increasing, and there are numerous causes of local attraction, care should be taken to ascertain the true variation, and back sights should always be had to discover any local attraction that may exist. I have tried the variation of the Magnetic Needle in different parts of the Province, and find that it varies from 17° to 24° westerly.

It would be highly advantageous to establish several Meridian Lines in the Province, to aid the surveyors in each district; and their compasses and circumferencers should be compared on one of these Meridians, in order to determine their correctness.

After the Canada line has been fixed, it will probably be considered necessary to lay out one or two new Counties in the Northern and Western part of the Province.* My abridged Report of the Tobique will shew the agricultural capabilities of a large tract of country in that quarter.

I am happy to learn that the Coast Survey of Captain Owen will extend up all the Rivers of the Province, so far as they are navigable for boats, and I beg leave to offer the opinion, that it would be of great advantage to the Province to possess an accurate survey of the principal Streams running into the interior.

Few, if any, of the County or Parish Lines have even been explored or run, and serious difficulties have arisen from the want of knowledge in regard to distinct boundaries.

A Geographical and Geological Survey of their boundaries might be continued after the manner of the Ordnance Survey now going forward in England. A work of this kind would be important to science, and in opening of the resources of the Country; nor would the expense extend beyond the means which would naturally fall to so useful an object.

* The Township laid out at the Great Falls would be favorably situated for a seat of Magistracy.

PART II.

GEOLOGICAL REPORT.

GEOLOGY, as a science, in the most comprehensive meaning of the term, signifies a knowledge of the structure of the earth. It embraces all the operations that have taken place in the globe, from its surface to its deepest centre; and all the different changes that have occurred in the organic kingdoms of nature.

The rocks and minerals, forming the crust of the earth, are not only interesting as objects of science, but they are also invaluable in the different arts, and, next to the vegetable kingdom, they are necessary to the support and happiness of mankind.

The great variety of soils spread over the globe have had their origin in the rocks forming its exterior part; and therefore geology is a most important auxiliary to agriculture.

Vegetables, from being influenced in their growth by soil and climate, are governed by a variety of circumstances of a geological nature, and as the earth is the basis upon which all are fixed, every change in its surface produces a corresponding change in the character of plants; and even animal nature accommodates itself to the geological conditions of the earth's crust.

The physical features and scenery of every individual district have been derived from geological causes, through whose agency the sublime grandeur of the mountain and the beauty of the valley have been produced.

In pursuing a study so wide and important, the labours of an individual are indeed insignificant; but they may be so applied to a particular district as to render them highly useful in an economical point of view; and, by the united industry of a great number of persons, a vast collection of facts is obtained, which establish the science and explain many of the mysteries of nature.

In continuing the Geological Survey of New-Brunswick, our labours were commenced where they had terminated last season, and to the discoveries previously made others have been added.

The geological exploration of the Province had been extended to all the Southern and Eastern Counties, and Northward to a line drawn from Woodstock to Boiestown, and along the Miramichi River to its mouth.

During the past season the rocks between Woodstock and the Grand Falls were examined, and explorations were made of the Tobique, Grand, and Restigouche Rivers, and also of a part of the coast between Bathurst and Dalhousie, along the Bay Chaleur.

It will be seen hereafter that these districts offer a most interesting field of inquiry, being valuable to the Province on account of the minerals they contain.

In taking a general view of this part of the Country, it may be remarked, that its geology is by no means simple. The number and variety of the formations, and their relation to each other, afford subjects for very extensive research.

The stratified rocks at numerous places abound in fossils, and therefore offer an ample opportunity for the exercise of that part of geological science which inquires into the nature of animals now only known by the relics they have left of their existence.

The tract of country under consideration may be said to extend from the River Saint John, between Woodstock and Madawaska, to the Bay Chaleur and the Restigouche. A section has been made across this tract, one hundred and fifty

miles in length. It was penetrated on the Tobique to the distance of eighty miles, and its borders were examined to considerable extent; but as almost the whole of the district is covered with the native forest, and is not inhabited, the facilities of examination are much diminished, while the labour and expense of exploration are greatly increased.

For general purposes it may be stated that the rocks along the Saint John, between Woodstock and Madawaska, consist of argillaceous and calcareous slates, grauwacke and grauwacke slate, limestones, sandstones, and conglomerates belonging to the transition series of the older geologists. The strata are penetrated by numerous dikes and veins of trap. The same kind of strata, with the accompanying dikes, were found to occupy a part of the State of Maine to the southwest, and, crossing the Saint John, they were seen along the whole of Grand and Restigouche Rivers, and the shores of a part of the Bay Chaleur. They appear also in the district of Gaspé, and were followed from the southwest to the northeast two hundred and fifty miles.

These strata are not, however, perfectly continuous; for about midway between Woodstock on the south and Dalhousie on the north, there is a chain of mountains consisting of granite and other rocks generally admitted to be of igneous origin.

This extensive group of transition strata appears to have formed an original surface, which was broken up by the upheaving of a chain of mountains and hills. It is interrupted by lofty masses of granite and trap. The veins of these rocks seen penetrating the slate, grauwacke and limestone, are evidences of their subsequent protrusion. The same group is also overlaid by deposits of red sandstone at Eel River near Dalhousie and at other places. On the Tobique River, they are surmounted by red sandstone, red marl, limestone and gypsum. Above these there are tertiary deposits, containing both marine and fresh water shells, and on the surface there is a general distribution of sand, gravel, loam, and boulders.

It will appear in a more detailed account of the geology of this part of the country, that very extensive districts are composed of the rocks denominated transition. They consist of strata now known as the "Silurian," which have been separat-

ed from the older schistose rocks into a new group, and ably described by Mr. Murchison.* These abound in fossil corals and shells, and afford another instance of the identity of American and European strata.

We may enter upon the consideration of each of these different classes of rocks in the order they occur, descending from the upper to the lower deposits. When the geological exploration of the Province is completed, a full chronological arrangement of the rocks will be given, with a map and illustrations.

The order of chronological succession in the stratified rocks and superficial deposits, as it has been discovered in the northwestern part of New-Brunswick, may be represented in the following manner :—

RECENT ALLUVIUM.

ANCIENT ALLUVIUM.

TERTIARY { Tertiary deposits, containing fresh water shells.
Tertiary deposits, containing marine shells.

RED SANDSTONE { Red sandstones and conglomerates.
Limestone.
Red sandstone and gypseous marls.
Gypsum.
Red sandstones, red marls and conglomerates.

COAL MEASURES—Sandstone, shale and coal.

SILURIAN { Upper silurian.
Lower silurian.

CAMBRIAN { Argillaceous slate.
Grauwacke.

Unstratified Rocks.

Granite.
Sienite.
Trap.
Serpentine.

Veins of granite have been found intersecting the lower grauwacke and argillaceous slates. Dikes of trap extend through the Cambrian and Silurian strata, and may be discovered hereafter in the red sandstone in the manner they exist in

* "The Silurian System, founded on geological researches in the border Counties of England and Wales, with descriptions of the Coal Fields and overlying formations, by RODERICK IMPER MURCHISON, Esquire, F. R. S., &c. : Royal 4to. : London : 1839."

the southern parts of the Province, and in some of the sand-stones of Nova-Scotia.

The general direction of the strata is from the southwest to the northeast. The strike of the beds is, nevertheless, variable, and the upturned edges of the layers are sometimes bent in salient angles.

The minerals contained in these rocks will be noticed at the close of the Report.

RECENT ALLUVIUMS.

The operations of the atmosphere, rain, dissolving snow, frost, and other agents, are constantly wearing down the hardest rocks, and modifying the surface of the earth. The materials forming the most solid parts of the globe are thus disintegrated and sometimes decomposed; and being carried downwards by streams of water, or upwards by the tides, they are deposited along the rivers and in the estuaries of the sea, in the form of gravel, sand, clay, or loam. These are called alluvial deposits. The fine alluviums skirting the Saint John and other rivers of the Province have chiefly resulted from the overflowing of the streams whereby a layer of fine sediment is periodically deposited over the lower grounds.

The fine tracts called intervale have been produced by similar causes; and they afford a kind of history of the streams that pass through them, which from time to time have had their levels lowered; whereby the steps or terraces on their sides have resulted. In no part of the Province are these terraces more beautifully displayed than at Woodstock, and on the banks of the Saint John, between that place and the mouth of the Tobique River.

The formation of terraces has been explained in the Fourth Report on the Geological Survey of the Province, page 54.— Since the publication of that Report, terraces on the Tobique, Restigouche and other rivers have been observed.

At Mr. Henry Shaw's farm, a few miles above Woodstock, there are four of these steps; the same number appear at Hayden's Ferry. Two miles below the mouth of the Presq' Isle, there are five terraces, and the river at this place has worn

down its bed to the depth of sixty feet. At the Flat Lands, on the Restigouche, there are four terraces.

Alluvial flats and basins are sometimes formed by obstructions in the streams, from rafts and jams of timber, which result in dams, and cause the lands to overflow. In the basins, thus formed, the fine sediment collects, and rich alluviums are formed. In the country, and near the sources of the rivers, such alluviums are by no means of rare occurrence; and there are instances when they have been produced by the dams built by the industrious beaver.

Of the alluviums of the sea, only a few small tracts occur, within the district explored during the past season. They are situated at the mouth of the Restigouche, and being very small collections, they are not to be compared with the great marshes of Westmorland, where the great elevation of the tide is highly favourable to the production of this kind of soil. In all these alluvial deposits there are great quantities of logs, leaves of trees, &c., and sometimes the bones and horns of wild animals.

From the great length of the Saint John, the rapidity of the current, and the yielding nature of the rocks through which it passes, extensive alluvial tracts have been formed upon its sides and along the low grounds upon its borders. The Restigouche is also a rapid stream, but the rocks of its mountainous region supply but little sediment, and during the summer months its waters are pure and limpid. The alluviums along its borders are therefore scanty.

ANCIENT ALLUVIUM.

The several deposits arranged under this head, are frequently called "*Terrains de Transport*." These terms are intended to include all the loose mineral materials which are spread over the surface. They consist of erratic boulders, gravels, sands, and clays. The lowest of these beds generally consist of blue and yellow clays: then there are collections of gravel, often a hundred feet in thickness, distinctly stratified and marked with *water lines*. That these stratified beds were deposited through the agency of water there can be no doubt, as they exhibit all those peculiar marks seen in the sands at the mouths of rivers

and on the sea shore ; but they appear upon a scale far greater than can be comprehended by reference to the largest rivers or bays where the tides are most violent.

Above those beds there is another deposit of boulders, sand and gravel mixed indiscriminately, and seldom exhibiting any marks of stratification. In the production of these three different kinds of deposits there appear to have been the same number of causes in operation. The clays were doubtless the fine sediment that fell from the tranquil waters. The stratified beds of gravel and sand offer every kind of evidence of having been fixed in their present positions by the action of water in motion ; while the confused heaps of boulders and gravel must be ascribed to some cause of which drift ice offers the best explanation of the phenomena that can be afforded.

In almost every part of the Province, boulders of different kinds of rock, with collections of *debris*, are scattered over the surface. In many instances, I have traced these boulders to their birth-places—to the hills and mountains, whence they were drifted. Whatever might have been the cause of their transportation, in almost every instance, they have been carried from the north to the south ; and the same current that forced them away from their original sites, has swept over the whole Continent of America, its course having been modified by the hills and valleys over which it passed. On the north side of the Province, there are erratic blocks, which have been evidently transported across the Gulph of Saint Lawrence and Bay Chaleur, and the granite boulders of Bald Mountain are found a hundred and fifty miles to the south.

In New Brunswick there is an extensive tract of level country, where boulders and drift blocks of stone are numerous, and where the surface of the rocks is deeply furrowed and scratched with parallel *striae*. It has been supposed, by some Geologists, that these *striae*, as they appear in other parts of the globe, were produced by glaciers, which also transported the boulders. But there are no mountains within the distance of two hundred miles from which glaciers could have descended to the eastern parts of the Province ; and, in order to have reached the sites where the loose drift blocks of stone now appear, they would necessarily have had to cross the Bay Chaleur, or large rivers, and to have pursued their courses up

some steep acclivities, before they arrived at the places of their destination. However certain it may be that the vast quantities of *debris*, found at the bases of the Alps, and other lofty mountains, have been carried downwards by glaciers, the transportation of boulders and the striated surfaces of the rocks in New Brunswick and Nova Scotia cannot be explained by the glacial theory.

At Saint John, Hampton Ferry, Saint Stephens, Grand Falls, and numerous other places in New Brunswick, the parallel grooves and *striæ* are seen extending horizontally along the sides of the highest hills. Their direction is from the northeast to the southwest, varying from 20° to 40° eastward of north, and from 20° to 40° westward of south. The hills and the valleys are furrowed in the same direction, being covered with the same erratic masses. All the facts, when taken together, will not support that theory which applies to countries whose mountains are covered with "eternal snow."

The fields and masses of ice that float in the great Bays of North America during the spring, and the icebergs of Baffin's Bay, and the ocean still farther north, offer a far better solution of this question than can be derived from the other source. These icebergs and fields of ice, from freezing fast to the shores, become loaded with rocks and gravel; they are then lifted by the high tides, and drift to great distances, carrying with them great quantities of rocks, *debris*, gravel, sand, &c. From being urged over the rocks and shoals by the currents, the protruding masses scratch and furrow the rocks beneath in the direction of the current. In the spring, the heat of the sun gradually dissolves the ice, until the weight of the rocks, gravel, &c. predominates, and the remainder of the reduced mass sinks. Such as are stranded on the shore at high water, and are there dissolved, leave a collection of stones, gravel, and sand, and sometimes soils with plants. Frequently these confused collections of mineral and vegetable matter are transported by the winds and tides several hundred miles. The close resemblance of these collections to those of the ancient alluvial and boulder formation, is such as can scarcely be mistaken; and although the erratic collections, called diluvial, are far superior in magnitude to the ice deposits upon the coasts, they possess many similar features.

It is not doubted that the whole of this northern continent was once beneath the sea. The transportation of rocks, gravel, and sand is therefore in the order of natural events.

Mr. Lyell, in his *Principles of Geology*, has treated this subject with great care and ability, and the views he has therein set forth, are in accordance with the facts as they may be seen in these Northern Colonies.

TERTIARY DEPOSITS.

Upper Tertiary, containing Fresh Water Shells.

In former Reports, I have described the tertiary strata of the southern Counties, which agree with the others situated along the shores of the Counties of Restigouche and Gloucester; but all these deposits differ materially from those I have called upper tertiary. The latter were first seen near Belle Dune Point, on the farm of Mr. James Galbraith. They are strata of yellowish white marl two feet in thickness, and probably occupying an area of forty acres. They are situated beneath five feet of peat, containing the trunks and roots of decayed trees. This marl is almost a pure carbonate of lime, and closely resembles chalk. It abounds in the remains of several species of fresh water shells, all of which still exist in the Province.

This deposit is near the Bay, and is only elevated above the sea about fifteen feet. Its site appears to have been a fresh water lake, and the white chalky marl now contained in it has probably been derived from the decomposition of lacustrine shells.

Near Dalhousie there is a similar deposit, and I had previously discovered the same kind of formation in Nova-Scotia.— When the country shall be more cleared of its forests, other beds of shell marl will probably be discovered.

Lower Tertiary, containing Marine Shells.

These strata consist of brown and buff-coloured clays and blue and lead-coloured marls, containing great numbers of marine shells.

About four miles north of Bathurst, on the shore, and reposing upon red sandstone, the tertiary beds appear in the following order:—

Soil,	6 inches.
Stratified sand and gravel,	5 feet.
Blue marl, containing marine shells,	4 feet.
Brown clay, with shells,	2 feet.
Sand and gravel,	Depth unknown.

The same strata have been penetrated in sinking wells in the town of Bathurst, Petit Roche, and other places along the shore.

On the north side of Jacquet River at its mouth, and extending along the shore to Nash's Creek, the tertiary deposits are exposed, and present a steep embankment towards the sea. At this place the bed of blue marl is eight feet thick, being surmounted by the stratified sand as before mentioned. From the great numbers of the *mya mercenaria* contained in the marl stratum, the inhabitants call it the "clam bed." The valves of *balani* are very numerous, and far exceed in size any that now inhabit the coast. Two species of *mytili*, *pecten concentricus*, *venus mercenaria*, and other shells, are common. With these there are the remains of marine plants, which yield the peculiar odour of marsh mud.

At the north River Charlo, just above the bridge, the blue marl stratum is fourteen feet in thickness, and is situated beneath seven feet of sand and pebbles. At other situations along the coast it offers few other characters than those already described.

The height of the tertiary strata is on an average fifteen feet above the level of the sea. They are contemporaneous with the tertiary deposits along the shores of the Bay of Fundy; notwithstanding, on the latter coast they have an average elevation of twenty feet. The similarity in the mineral character of the beds and the identity of the shells, are proofs that these strata belong to the same period, and have been elevated by the same movement.

Of thirty different species of shells found in the lower tertiary deposits of the southern Counties, twenty-four still inhabit the present shores. The remaining six are probably extinct in this climate. Sufficient time has not been allowed to examine the *testacea* and *crustacea* of the northern marl beds; they are,

notwithstanding, known to be similar to those of the south, already described.*

Above these tertiary strata, there are the ancient alluvial deposits, with boulders and other drift masses. From all these circumstances, it is evident, that while the animals of the tertiary strata were in a living state, the sea occupied a higher level than it does at present. These animals were buried beneath beds of gravel and sand, mixed with erratic fragments of rocks. Finally the whole surface of the Province was lifted up, or the sea was withdrawn from it, and the whole of these formations, with their living marine animals and plants, were elevated above the sea, where they still remain. We have the indisputable evidence that New-Brunswick has been subject to those remarkable geological changes which are also known to have taken place in other parts of the world.

RED SANDSTONE.

The next formation in descending order is the red sandstone. The exact limits of the rocks belonging to this group could not be ascertained in an uncleared and uninhabited country. They are, notwithstanding, supposed to extend over an area of four hundred square miles in the western part of the Province, and they have been coloured on the geological map as correctly as the circumstances would admit of.

The rocks belonging to this system are situated on both sides of the Tobique River, between the Red Rapids and the Blue Mountains, and they extend several miles west in the direction of the Grand Falls and Grand River, and eastward along the courses of the Agulquac and Wapakanegan. This group of strata consists of red sandstones, conglomerates and marls, associated with limestones, gypsum, and salt springs, and they repose unconformably upon the silurian rocks. From being unable to discover any organic remains in the formation by which alone its relative age can be correctly determined, I have hesitated to affix to it the term of either new or old red

* See Third Report on the Geological Survey of the Province of New-Brunswick—page 18. 17

sandstone. The presence of gypsum or salt does not decide the age of the group, for Mr. Murchison, in his travels over Russia, found those minerals contained in the old red sandstone or Devonian system, and from some facts pointed out to me by Mr. Lyell during his recent visit to this country, it does not yet appear certain to what group the gypseous sandstones of Nova-Scotia and New-Brunswick belong. I am, notwithstanding, of the opinion that they will, upon extensive research, be found to constitute the group known as the new red sandstone, which has not been always duly distinguished from the Devonian system beneath the coal.

The rocks of the group under consideration present many varieties in composition and colour. The conglomerates in general are hard and compact, and the cementing matter is both argillaceous and calcareous. The sandstones are both fine and coarse-grained, with a prevailing colour of brick red. But occasionally the strata are grey, and even white, the whole being streaked with patches of green. With these there are layers of indurated clay and red marl, gypseous and calcareous marls, slaty sandstone and red shale. Some of the strata are filled with nodules of limestone.

GYPSUM.

About two miles above the mouth of the Wapaskanegan, on the Tobique, the Red Sandstone, interstratified with Gypsum, presents a perpendicular cliff one hundred and thirty-five feet in height. The Gypsum is of the compact and fibrous varieties. The former occurs in beds from one to six feet in thickness. Its prevailing colours are red and dark chocolate colour. The fibrous variety is in thin seams of a beautiful white and straw colour. The strata dip northeast by east 5° . The Gypsum also occurs in the sides of the Wapaskanegan, and at other places in its vicinity.

This Gypsum will be very valuable to the agriculture of this part of the Province, and small quantities have been already successfully applied to lands in the upper parishes of Carleton. It may be transported along the stream before mentioned, across a short portage, and down the Miramichi to the Northern Counties of the Province.

SALT.

About half a mile above the Gypsum cliff, a small brook of brackish water enters the Tobique from the eastward.— This brook proceeds from a salt-spring, situated about a mile from the river.

LIMESTONE.

Half a mile farther northward, the red sandstones and marl are succeeded by a coarse white sandstone, and thin Limestone. The surface of the Limestone is much broken, and the formation is evidently cavernous. The rock is frequently cellular, and the cells are often filled with stalactical concretions. The red sandstone and marl cover the Limestone to the north-east. The order of succession in these strata may be represented in the following manner, descending :—

Red Sandstone and Conglomerates.
Limestone.
Red Sandstone and Red Marl.
Gypseous Marls.
Gypsum.
Red Sandstone, with nodular Limestone.
Red Conglomerate.

The whole of the country occupied by this group of rocks is remarkably fertile. The soil in general is a deep red loam, admirably adapted for all kinds of grain. The same description of land in Nova-Scotia is most favourable to the growth of fruit trees, and there can be no doubt that apples, plums, and other kinds of fruit, might be successfully cultivated on the level grounds of the Tobique.

COAL FORMATION.

On the sides of the Restigouche River, between Dalhousie and Campbelltown, the rocks of a coal formation skirt the shore; they do not, however, extend far from the margin of the river, being met along the line of the road and at the base of a chain of hills by trap rock. They are sandstones, shales and conglomerates.

At Point Le Nim, four miles above Dalhousie, and along the shore to the distance of two miles, grey sandstones and soft shales are concealed on the side of the river. The shore is low and the rocks much exposed by the soil and shingle. Near the farm of Mr. John Currie there is one seam of coal two inches, and another four inches in thickness, contained between strata of shale, in which I observed the remains of *Sigmaria*. It is stated by the oldest Indians that the early French settlers obtained near this place a great supply of coal, but I was unable to discover any valuable stratum of that mineral at this place. It may, nevertheless, be found by a more careful exploration than the time allowed could accomplish.

The shales are met by a coarse breccia consisting of large boulders firmly cemented together. These, from their proximity to the trap rock at hand, have been evidently acted upon by heat, and they exhibit many of the characters of an igneous rock. The conglomerates and sandstone appear at Campbelltown, and other localities along this part of the Restigouche, being frequently cut through by dikes thrown out from the adjacent trap. The same soft shales appear at Point Le Garde and Battery Point—and at the latter place there are indications of coal.

All the rocks of Mission Point on the Gaspé side of the Restigouche are conglomerates, sandstones, and shales of the Coal Measures; the latter contain fossil plants, and thin seams of coal have been discovered.

Crossing the harbour at Dalhousie, and on the Gaspé side of the Restigouche below Escuminac Bay, I found the shore lined with a coarse conglomerate. Farther eastward the rocks are light blue sandstones and shales, containing the remains of vegetables. They present perpendicular cliffs from fifty to a hundred feet high, and extend along the shore a mile and a half. The shale is very soft and yielding, and the cliffs are yearly retreating before the tides and currents of the river. At this place the dip of the strata is north by east 12° . and the strike of the bed is east by south.

In these sandstones and shales, I found the remains of fish, and a small species of tortoise with fossil foot-marks.—These strata are succeeded by a brick red sandstone, which forms the crest of the high hills in the rear. Still farther east-

ward, the light blue sandstones and shales present a cliff seventy-five feet high, and the strata dip east 13° . They are then overlaid by a coarse conglomerate two hundred feet in thickness, and the conglomerate is again succeeded by red sandstone, the strata of which conform to the shales beneath.—Heron Island appears to consist of the same red sandstones which occupy a considerable part of the District of Gaspé.

Another tract of red sandstone examined during the past season, is situated in the County of Restigouche. It commences a short distance westward of River Charlo and extends to the mouth of Eel River, where it is met by trap rock. It also reaches in a southwest direction about twenty-five miles, or near the Upsalquitch, forming a fine level agricultural district. The even surface and fertile soil are characteristic of this rock. The strata repose unconformably upon the Silurian rocks, and consist chiefly of dark red sandstones, in which gypsum has not been discovered. No organic remains have yet been found in this rock, whereby its relative age might be determined.

SILURIAN SYSTEM.

It has been already stated, that between the Meductic, or Woodstock, and the Madawaska Settlement, on the Saint John, and occupying a large tract of country on each side of that river, there is a group of argillaceous, calcareous and siliceous rocks, to which the term transition has been applied. The same kinds of strata appear on the shores of the Bay Chaleur, between Bathurst and Dalhousie. To the northeast, they are also seen at Port Daniel, and other places in the District of Gaspé.

The Saint John passes through this vast group of rocks upwards of one hundred miles, running obliquely through the strata. The distance across the strata at right angles, so far as it has been explored, is about seventy miles. Between Bathurst and Dalhousie the same rocks occur along the coast to the distance of fifty miles. The interior of this part of the Province has not yet been explored. These rocks, therefore, may be said to occupy an area only exceeded in its dimensions by the Great Coal Field of New-Brunswick, as described in former Reports.

At the Meductic, Eel River, and head of the Nackawick, this group of strata is found reposing upon and dipping from granite. At the sources of the Upsalquitch, Nepisiguit, and Tobique Rivers, granite, trap, and other rocks of volcanic origin, form an anticlinal ridge, or axis. The stratified rocks dip from the mountains which have been evidently elevated since the formation of the sedimentary deposits. The slates are also seen reposing upon granite near Bathurst, being pierced by veins of that rock.

The formations referred to repose upon granite, and, taken altogether, may be considered the oldest rocks in the district under consideration.

The direction of this great system of rocks is from the southwest to the northeast, and the strata in general are highly inclined.

From the general agreement of these extensive groups of strata to those of parts of England, which have been admirably described by Professor Sedgewick and Mr. Murchison, I have been induced to use the names employed by those gentlemen, not only because their important divisions have been sanctioned in Europe, but from the applicability of the descriptions attached to them to the rocks of New-Brunswick. The term "Silurian" will, therefore, be applied to the upper division of the transition strata of the Province.

Beginning with the upper "Silurian" rocks, the descriptions will be given in the order of the examinations. The rocks that it is my object now to describe, consist of:

STRATA.

Impure grey and blue Limestone.
Calcareous and Argillaceous Shales.
Earthly rotten Shale.
Wenlock Limestone.
Compact blue Limestone.
Friable Sandstone.
Shelly Limestone.
Compact blue and grey impure Limestone.
Black, blue and red Shale.
Grey and brown Sandstones.
Compact Limestones.
Grauwacke.
Argillaceous and Calcareous Slates.
Coralline Marbles.
Conglomerates.
Clay Slate.

ORGANIC REMAINS.

Producta, Spirifera, Orthocera, Trilobites.
Crinoidea, Cyathophyllum Turbinum.
Atrypa Aspera—with numerous other Testacea and Corals.
Producta, Terebratula, Cyathophyllum Turbinum, Cyathophyllum Hexagonum.
Encrinural Remains, &c.
Tentaculites Ornatus, Producta, Terebratula, Corals.
Encrinural Remains.
Corals.
No Organic Remains.
No Organic Remains.

From the great extent and thickness of the above beds, I have been unable to take more than a cursory view of them, and the organic remains given are only such as were readily recognized in the beds examined, without reference to particular strata. They form but a part of the specimens obtained.

I was at once struck with the similarity of these fossils to those of the "Silurian System" of the United States, received from Professor Shepard, and others from Lockport, near Niagara. The formations at the latter place are described by Mr. J. Hall, employed in the Geological Survey of the State of New York, and the fossils have been examined by Mr. T. A. Conrad, of the Palæontological Department of that Survey.*

It is my intention to examine all the beds of the "Silurian System" in the Province in succession, and to give in detail the organic remains found in each stratum.

RIVER SAINT JOHN.

Commencing about fourteen miles above the town of Woodstock, on the River Saint John, the older slates and grauwacke, containing but few organic remains, are succeeded by dark-coloured clay slate, sandstones and flagstones. The strike of the strata is northeast by east, and dip 60° northwest. The sandstones are fine-grained and commonly siliceous; the slates are of various tints of red, grey and blue, and are remarkable for the contortions they present, being curved and bent in all directions. These rocks contain veins of white quartz, and sometimes thin seams of white iron pyrites.

At Flannagan's Hill, below the mouth of the Presq' Isle, the strata consist of dark-coloured slates and impure limestones. In the latter, I discovered beautiful masses of *cyathophyllum basaltiforme*, columns of *encrinites*, and casts of *productæ*. These fossils, with others, may also be seen in the drift blocks near the road.

At the mouth of the Presq' Isle, the slates become more argillaceous, and gradually pass into limestone containing veins

* See Report on the Geological Survey of the State of New-York, 1840—pages 200 and 252.

of calcareous spar. On the farms of Samuel Lovely and Roger Thompkins, there is some good limestone, and the slate is highly impregnated with calcareous matter. These beds are variably indurated and crumble down before the frost and the atmosphere. The only fossils found in them were a few pieces of corals. Near the mouth of the Shictahauk there are buff-coloured slates. About two miles above, and on the farm of Nathan Milberry, the slates are succeeded by thick strata of limestone. The strata here run north by east, and dip east by south 80° . They are sometimes laminated and broken by faults, especially when they are near the trap dikes. The only organic remains found in this limestone were the rings of encrinurites. Above these beds there is a thick deposit of clay slate and ferruginous sandstone, in which no fossils of any kind were discovered. Near Carr's Inn, the slates are soft and decompose rapidly whenever they are exposed to the weather. They are filled with veins of carbonate of lime.

Blue limestone, argillaceous limestone and calcareous slate are the prevailing rocks in the distance of six miles to the mouth of the River Des Chutes.

About five miles from the Saint John at this place is the eminence called Mars Hill, sixteen hundred and eighty-eight feet in height, with a base of about five miles in circumference. On the opposite side of the river there are Bear and Moose Mountains, belonging to the same range of high lands. These mountains are composed of rocks similar to those already described, excepting a solid and compact conglomerate which forms their crests.

The strata of these mountains, so far as it was possible to examine them in their uncleared state, belong to the class under consideration, having the same course, dip and general features. These mountains appear to have been produced by extensive denudation, and not by upheaval, for there were no volcanic rocks seen along their flanks or at their tops.

From the mouth of the Aroostook to the Grand Falls, and thence to Madawaska, a distance of forty miles, the strata exhibit a continued succession of blue limestone, red and black shales, argillaceous slates, red, chocolate-coloured, brown, and grey grits, sometimes interstratified with conglomerate. Many of the schistose beds are so little indurated, that they yield be-

fore the elements, and crumble down whenever they are uncovered. There are but few situations where the strata can be examined to advantage. At the deep gorge of the Grand Falls, they cannot be approached from the abyss below. The silurian deposits contain veins of quartz and the calcareous strata veins of calcareous spar.

Throughout the whole series, there are numerous dikes of trap rocks of all dimensions penetrating the strata at all angles, but most frequently insinuated between the beds. With these I observed a number of faults or dislocations by which the strata have been displaced.

Besides the fossils already mentioned, I found at several places undeterminable stems, *crinoidea*, *encrinites*, a *producta*, resembling the *producta depressa* of the Wenlock limestone.

The above rocks, characterised by the same fossils, were explored up the Tobique River to the distance of ten miles above its mouth, where they dip beneath the red sandstone already described. Near the sources of this river the older nonfossiliferous slates and grauwacke are met by mountains of trap rock and granite.

SILURIAN ROCKS OF THE BAY CHALEUR.

I have not had an opportunity to take more than a cursory view of the rocks between Bathurst and Dalhousie. Near the former place the older slates meet the granite, and, so far as my own observations extend, they contain no organic remains.

After passing a high ridge of trap rock near the entrance of the Little Nepisiguit, the Silurian strata begin to appear and present a few fossils peculiar to the group.

Near Petit Roche there are red and brown shales, red and grey sandstones, succeeded by strata of compact and slaty limestone, in which I found the remains of *testacea* and corals. Similar rocks occupy the shore to Belle Dune, except where they are broken through, pierced and overlaid by trap and serpentine, common along the whole coast. Wherever these rocks appear the strata are more or less broken and displaced, and the stratified beds are frequently changed in their charac-

ters, where they are adjacent to those ancient volcanic productions.

Near Belle Dune Point, the strata consist of red and brown shale, pure and impure limestone, and beds of grey grit. The shales and limestone contain the casts and remains of *spirifera*, *producta*, and other shells, with stems of *encrinites*, *favosites*, *gothlandica*, *cyathophyllum turbinum*, and unknown species of corals. I found a fossil coral at this place resembling *syringopora geniculata*, and another variety, a mass of which was nearly three feet in diameter across the base.

Between Belle Dune and River Charlo, blue and white limestone, calcareous and silicious grits, red, brown and blue shales are interrupted by trap dikes. The general direction of the strata is from S. S. W. to N. N. E. with a general dip to the W. N. W. The dip is very variable, and many of the strata are almost perpendicular.

On the south side of the River Charlo near its mouth, a compact limestone, with the shales, again appears. The limestone abounds in fossil testacea and corals. Some of the masses are almost identical with the Wenlock limestone of England, and whole strata are composed of fossil shells and corals, among which there is one resembling the *atrypa reticularis*. Similar rocks extend to near the entrance of Eel River, where they are overlaid by the red sandstones before mentioned.

Near Dalhousie, and half a mile southward of Demerisque's farm, the Silurian rocks again appear in a Cove about half a mile long. These rocks are met on each side of the Cove by the trap rock which forms the high hills and shore in the rear of the town. Southward the same rocks extend a mile towards Eel River, where they present lofty and perpendicular cliffs.

The strata of the "Silurian" group are only exposed to the distance of two hundred yards, the remaining part of them being buried beneath *debris* and shingle. The strike of the beds here is N. E. and S. W. and the general dip is 45° to the N. W. These beds belong to the group we have attempted to describe, but at this place they have been broken through and covered by the before-mentioned ridge of trap. These beds were examined by W. J. Henwood, Esquire,* who has described them in a communication to the Geological Society of Lon-

don.* They consist of calcareous shales and impure limestones. The organic remains, as given by Mr. Henwood, are *favosites gathlandica*, *producta depressa*, *atrypa aspera*, *crinoidea*, *leptena euglypha*, and *spirifera*. Besides these I obtained several shells whose species have not been determined.

At the Flat Lands, ten miles above Campbelltown, and near the farm of Patrick Ryan, the shales, flagstones, and limestones are also fossiliferous. Near Bracket's farm, on the opposite side of the Restigouche, the limestones and calcareous slates are exposed on the side of the river, and abound in fossil corals, *encrinites* and shells like those already described, and those of the Wenlock limestone and Ludlow rocks of the British Silurian strata. The above rocks at this place are cut through by trap dikes which are of different ages. The same rocks, accompanied with dikes, extend along the whole length of that part of the Restigouche that reaches towards the Saint John at Madawaska. They also cross the Bay Chaleur, and at Port Daniel they contain the fossils characteristic of the group.

It is not the object of a brief Report like the present to speculate upon the probable causes that have contributed to produce the phenomena presented by the rocky strata of the earth. If to those who have never entered upon the study of geology, the vast quantities of vegetable matter now seen in beds of coal, and surmounted by groves of lofty fossil trees, may seem surprising, the wonders of the "Silurian" rocks can scarcely appear less remarkable. We have not here the remains of a beautiful and luxuriant vegetation, the proofs of which are inscribed upon the strata of the coal field. The evidences of the growth of plants are few in the Silurian strata. But the most incontrovertible witnesses are afforded that the ocean's bed, clothed with living corals and myriads of living beings, has been uplifted. The sand and shingle of shores long since removed from the borders of the sea, have been changed into solid rock, and all the creatures that inhabited them have been cemented together in the common mass, now seen descending from the mountain's top into the deep abyss of the waters.

* Proceedings of the Geological Society of London—Vol. III., Part II.—page 452.

The coral reefs, with their wide lagoons and all their shelly inhabitants have been converted into limestone to invigorate the soil of the earth in its present condition, and the sand and mud of former ages are now rendered subservient to the wants of man, who safely inhabits the surface of the earth, and brings to his use the objects produced by the wreck of former Continents, and thus the bottom of the ancient ocean is rendered fertile by his care and industry.

CAMBRIAN SYSTEM.

This name has been applied to a group of rocks situated beneath the "Silurian" strata, from which it is not always separated by any very distinct line of demarcation, so far as its lithological character is concerned. The few organic remains, however, found in this group are sufficiently characteristic to make it appear that the forms of animal life during the period of the accumulation of its strata were different from those found in the upper Silurian rocks.

The rocks of this group extend from the American boundary line, and cross the Saint John a little above the Meductic, and proceed in a northeast direction towards Bathurst. They have been followed to the Main North West Miramichi, and probably continue to the Nepisiguit, which has not yet been explored. The same rocks appear near Bathurst, and on the Tete-a-gouche and its neighbouring streams.

The strata consist chiefly of grauwacke, grauwacke slate, and clay slate. The grauwacke may be compared to a very compact sandstone. There are also beds of conglomerate, containing boulders and pebbles of almost every variety of rock. The cementing matter is generally calcareous or argillaceous; but it is sometimes silicious, and the beds change imperceptibly into quartz rock. The slates are of different colours: red, blue, and green are often seen. Many of them contain lime, and others will supply roofing slate.

On the Tete-a-gouche river the slates are very diversified in their colours, and remarkably compact.

The rocks of the Cambrian group of the district explored during the last season are highly metaliferous. Below the

Meductic they contain the sulphurets of iron and copper in small veins. At Woodstock there are three deposits of iron ore, having an united thickness of seventy feet, being interstratified with red slate. The ore itself is distinctly stratified, and the beds conform to the strata in which it is contained, being evidently a part of the same formation. The beds of ore were found to extend across the river.

Narrow seams of quartz and carbonate of lime pass through the grauwacke and the slates in almost all directions, and many of the beds are metaliferous, being pierced by veins of iron and copper pyrites, and more seldom manganese.

GRANITE.

Beneath all the stratified deposits we find granite. This rock is well displayed where it crosses the Saint John at the Meductic. It also occurs beneath the slates at the sources of the Tobique, where it is associated with sienite and trap. In the County of Gloucester it sends veins into the superincumbent strata. And in the District of Gaspé it rises from beneath the Cambrian group into lofty mountains. The granite presents several varieties. At the Pokiok, the feldspar, one of its constituents, is red; the mica, also, is very variable in colour. The quantity of its minerals is also irregular, and it passes into

SIENITE.

The most common varieties of sienite consist of hornblende, feldspar and quartz, but both the granite and sienite are so variable in their mineral composition, that a perfect description of them would be difficult, and is scarcely necessary in the present Report. Besides quartz, feldspar, hornblende and mica, these rocks sometimes contain other minerals in a crystallized state; and they are frequently so nearly allied to trap rock that it is difficult to decide where one of them terminates, and the character of the other is fully established.

TRAP.

The principal localities of this rock in the district explored during the past season, have already been noticed. It forms the chief part of Blue Mountain, near the Tobique; and between Dalhousie and the Flat Lands on the Restigouche, there is a high broken ridge of that rock running parallel to the river, being met on its south side by the red sandstone of Eel River.

The whole of the strata of the "Silurian" and "Cambrian" systems are penetrated by many dikes and veins of trap. These dikes are of different ages, as masses of various kinds are seen crossing each other in them, having been thrown up at different periods. On the Restigouche River, there are a number of instances where lofty hills of this kind of rock have been apparently forced upwards through the slates and older stratified rocks.

Hornblende and feldspar are the chief minerals in the trap. The rock is always of a crystalline structure, and the prevailing colour is green, from which the term greenstone has arisen.

SERPENTINE.

Between Bathurst and Belle Dune Point, there are masses of serpentine elevated in naked ridges above the soil. I observed that this rock was more common in limestone districts than elsewhere. It sometimes contains talc and narrow seams of asbestos. Occasionally where the serpentine is in contact with limestone, it sends small veins into that rock, and thereby forms a beautiful variety of marble called *Verde Antique*.

In concluding this part of the subject, it may be remarked, that the topography and characters of granite and other rocks supposed to be of volcanic origin, have been but briefly touched upon, as only a very limited part of the districts occupied by those rocks has been examined. A more perfect account of the unstratified deposits in the interior can only be produced by a careful survey of the country where they are situated.

ECONOMIC GEOLOGY.

It has been deemed proper to arrange the useful rocks, ores, and other substances belonging to the geological department of the district explored during the past year, under the above title. An account of the varieties of soils belonging to the Province is necessarily deferred until sufficient leisure is afforded for their analysis, and until the exploration is completed.

PEAT.

The localities of peat are so numerous in New-Brunswick that it is not necessary to describe them. It occurs in the low grounds of almost every county, and with a little observation it may be readily discovered. This substance is derived from the decay of mosses and other plants that only flourish in moist places. In the fibrous peat the plants still retain a part of their original structure. The compact peat is reduced to a homogeneous mass. Both varieties frequently contain the roots of the spruce, fir, cedar, and other trees that have grown upon the bogs. Beneath the peat bogs we frequently find beds of marl containing the remains of fresh water shells.

Peat is valuable for fuel; but from the abundant supply of wood in the Province, many years will elapse before it will be employed for domestic purposes in the rural districts. But this substance is of great importance to agriculture, and, by proper management, may be made an excellent manure.—Peaty grounds are improved by carrying upon them any poor soil; while sandy soil, from being deficient in vegetable matter, is improved by peat properly prepared.

Peat, when taken from the bog and applied to soil already containing a due proportion of vegetable matter, is worthless. It is necessary that it should be brought into a proper state of fermentation by mixing it with other kinds of manure. It should therefore be carried into the barn yard, and there mixed with "wash," straw, barn manure, &c.; it is thus renovated, and made applicable to the soil. But this substance is most

valuable when formed into composts with marl, or lime, straw, and earth from the barn yard.

On the sea coasts, peat may be made into composts with sea weeds; and at places where marl or limestone may be procured, the soil may be made very fertile by a judicious employment of compost manure made of peat and lime.

Both lime and peat are very extensively used as manures in Great Britain, and it cannot be supposed that they will be less beneficial in New-Brunswick. Farmers will derive great advantage from the use of peat as a manure: the experience, readily acquired, being all that is necessary to render it truly valuable in agriculture.

FLUVIATILE ALLUVIUM.

Alluvium is a fine loamy deposit, arising from the sediment of water. Being decomposed by meteoric agents, the solid rocks yield a yearly supply of finely divided particles. These are brought down from the hills by rains, and are finally laid along the sides of the streams, or in basins fitted to receive them. The alluviums thus formed are called "intervalles." They are very extensive in the Province, and afford some of its richest and most productive lands. This kind of alluvium may be advantageously employed as a manure, especially on sandy soils.

There are large alluvial tracts in the Province, which, from the want of drainage, have been converted into swamps. Many of these have been receiving, for a long period of time, the sediment washed from surrounding tracts, and contain rich soils. The expense of draining is the objection made to their improvement, and many of them will probably remain in their present unproductive state until agriculture shall be greatly advanced, and the fine tracts of ungranted land in the Province shall be occupied.

ALLUVIUM OF THE SEA.

Marine alluviums are produced by the action of the sea, which frequently transports and deposits in its estuaries large

tracts of soil called marsh. These alluviums are very limited within the district explored in 1842,—being chiefly situated along the shores of the Northern Counties. They also afford excellent manure, which, in Nova-Scotia, is successfully applied in raising wheat.

MARL.

There are numerous beds of marl on the coast between Bathurst and Dalhousie, in the Counties of Gloucester and Restigouche. They are also common beneath peat bogs in different parts of the Province. Some of these have been noticed in the Topographical part of the Report. Marl may be considered more valuable than lime for manure, from the vegetable matter it contains, and from being procured at a cheaper rate. Its employment as a manure is steadily advancing, and the experiments made, by applying it to different kinds of soil, have been successful during the past year. It is particularly recommended in making composts. The white marl of Gloucester and Restigouche will burn into quicklime. Care must be taken in the employment of strong marl, as the lime it contains when applied in too great a quantity will destroy vegetation altogether.

In some marls clay is predominant; these are admirably adapted to sandy soils. A series of careful experiments is recommended for each variety.

CLAY.

Beneath the soil in every part of the Province, there are frequent beds of clay. Its colours are white, brown, red and blue. Each variety will afford the materials for different kinds of pottery and bricks. Some clays contain lime, which renders them unfit for the above purposes. Clays are also useful for manures on sandy soils.

SAND.

With the clays there are beds of sand, which is also used in the manufacture of bricks. At many places, there are strata

of pure white sand suitable for the manufacture of glass. A fine white sandstone was observed on the Tobique River which would also probably afford good glass.

SALT.

Only one of many salt-springs in the Province was visited by myself during the past season. It is situated about a mile above Plaster Island, on the Tobique. The water of this spring is salt, but as it has not been submitted to any analysis the quantity contained in it is yet unknown. There can be no doubt, however, that salt may be made by evaporation of the water from the above spring, and its situation far in the interior of the Province renders it very valuable. The price of salt at the mouth of the Tobique is seven shillings and sixpence per bushel. I am of the opinion that it might be made at the salt-spring for two shillings and sixpence per bushel.

GYPSUM.

The situation of the gypsum on the Tobique has been already described. This mineral is destined to be very advantageous to the agriculture of the Northern and Western parts of the Province. It has already been employed in small quantities to lands bordering on the Saint John, but in no instance has it been calcined. The advantages derived from its use in its native state are said to be considerable. The inhabitants are, nevertheless, recommended to burn and grind the gypsum, for experience has proved that calcination renders it far more efficacious as a manure than it can be in its native state. The plaster of the Tobique may be readily calcined and ground at the quarries, and from thence transported to any part of the Province.

LIMESTONE.

Limestone is abundant on the banks of the Saint John, between Woodstock and the Grand Falls and on the Tobique

River. It also occurs plentifully at Madawaska, along the Restigouche, and the country between Dalhousie and Bathurst. Its localities are too numerous to require description. Its colours and solidity are extremely various. The best limestone of the County of Carleton is of a pale blue colour. On the Tobique it is buff-coloured, and on the north shore of the Province it is sometimes almost a pure white.

The value of the limestone situated in almost every part of New-Brunswick, can scarcely be estimated until it is more generally introduced into agriculture. From being situated along the sides of the great rivers, it can be transported at a cheap rate, and widely employed in every quarter. Some directions for burning lime and the plan of a proper kiln will be given in the appendix.

WATER LIMESTONE.

There are several kinds of impure limestone which afford, upon being burnt, hydraulic cement, or lime that will harden under water. Some of the limestone near the Presq' Isle, Belle Dune Point, and near Dumeresque's farm, at Dalhousie, are of this variety. At present all the hydraulic cement used in the Province is imported from the United States, whereas it might be manufactured in the Province.

FREESTONES.

The red sandstones of the Tobique will afford some excellent durable freestones. A number of the strata belonging to the Silurian rocks, as seen between Woodstock and Madawaska, are also well adapted for buildings. Their hardness, however, will greatly increase the price of cutting, while the red freestones may be obtained at a low rate.

Between Dalhousie and Campbelltown, there are some good freestones. The best strata are on the Gaspé side of the river, and may be obtained opposite Dalhousie and near Mission Point. The best freestones at those places are of a light blue colour. They are easily worked, and become hard when exposed to the sun.

FLAGSTONES.

Flagstones may be raised in great abundance from the grauwacke along the Saint John. Between the Presq' Isle and the mouth of the Aroostook, there is some flagging of a superior kind; at the gorges of the Tobique and Grand Falls it is also abundant, and the whole of the Restigouche river abounds in this useful kind of rock.

GRINDSTONES.

The only strata capable of being made into good grindstones, observed during the exploration of 1842, belong to the coal field at the mouth of the Restigouche. They are associated with the freestones and blue grit. There is also an even-grained grey sandstone in the same district that is well adapted for the sharpening of edge-tools.

SLATE.

Roofing Slates may be procured at a number of situations described under the "Cambrian System." Before any correct opinion can be formed of the quality of the slate, it is necessary to remove the rocks of the quarry to some depth, for where they are exposed to the weather, frost, &c. they are much fractured and decomposed. The presence of lime and some varieties of iron pyrites are also injurious to roofing slate, which should be compact, light and durable.

At Jackson Town, near Woodstock, there are red strata, which I am of the opinion could be split into roofing slate. There is also some blue slate in that quarter.

Roofing Slate sometimes occurs in the banks of the Restigouche, but in general the strata along that river are too calcareous to be very durable.

MARBLE.

Some of the limestone already described will supply good marble. An elegant marble may be obtained near Petit Roche,

in the County of Gloucester. The prevailing colour of the rock is white, which graduates into buff-colour, green and gray. The rock is compact and semi-crystalline, and will receive a fine polish. Between the above places and Belle Dune, I found the limestone mixed with veins of serpentine, forming that beautiful variety of marble called *Verde Antique*. Machinery might be erected on some of the streams, and the marble might be sawed and polished, when it would equal in beauty the *Verde Antique* of any other part of the world.

CORALLINE MARBLE, ENCRINITAL MARBLE.

At River Charlo, a compact marble is filled with the remains of the rings of encrinurites, corallines, &c. This rock when cut and polished, besides being a durable marble, would exhibit its organic remains in great perfection and beauty.

SERPENTINE.

This rock has received its name from a resemblance it bears to the skins of serpents. Its principal colour is green spotted, shaded and varied with other colours. It is frequently readily worked, and the richness and variety of its colours render it valuable for ornamental sculpture. Serpentine is common on the shores of Restigouche and Dalhousie.

GRANITE.

The granite at the sources of the northern rivers is too remote from navigation to be useful for architectural purposes for many years to come. Some of the specimens examined from the head waters of the Tobique are of a good quality. Granite is abundant at the Meductic on the Saint John, and at several places the red feldspar variety is well adapted for buildings.

ROAD MATERIALS.

Among the objects recognized by the proper geological exploration of a country, is the discovery of suitable materials

for roads. It will be obvious to every traveller that the great difference in the state of the streets, or roads, in different districts, depends upon the quality of the materials employed in constructing them. The nature of the soil, facilities for drainage, and, in woody countries, the removing of trees to promote evaporation, are subjects of consideration, but more especially the materials used have an important office in the strength and durability of roads.

In that part of New-Brunswick which is included in the present Report, the soils are greatly diversified in their characters. But in almost every quarter good materials for roads are abundant.

The gravelly *debris* of the clay slates, sometimes occurring between Fredericton and Madawaska on the great road to Canada, is altogether unfit for roads, as it soon breaks up and is finally converted into a slippery clay. The same remark will apply to the calcareous and argillaceous shales. The fragments of compact limestone and grauwacke are far more durable, and, therefore, should always be preferred.

In the western part of the Province, there are numerous beds of coarse drift gravel, well adapted to resist the constant grinding produced by horses' feet and wheels.

The alluvial soils called *intervalles* are almost impassable during the rains of spring and autumn. The application of coarse gravel to the *intervale* roads would greatly improve them.

In the northern parts of the Province, the roads frequently pass over tracts of light sand and loam, which, although they are dry, greatly impede the progress of animals and carriages. The application of clay to such soils is more advantageous than gravel. The latter will move with the sand, but if coarse gravel with clay be applied, a good road will be the result.

It sometimes happens that the road passes over the proper materials for its construction, in other instances it is necessary that it should cross over peaty land and swamps. The employment of peaty soil or decayed vegetable matter of any kind will injure roads rather than improve them, notwithstanding such material are sometimes used in the Province.

Broken trappean rocks are admirably adapted for roads. The trappean gravel is abundant between Dalhousie and Campbelltown and along the Restigouche. It may sometimes

be obtained on the Great Road to Canada. Viewed altogether, the district under consideration abounds in excellent road materials, and frequently they may be applied very cheaply.

COAL.

There is a coal field at the mouth of the Restigouche, but its limits have not yet been explored. The rocks of the coal series are seen on both sides of the river, between Dalhousie, Point Le Garde, and above Mission Point. At the latter place coal has been discovered. Two narrow strata of good coal appear at Point Le Nim, four miles above Dalhousie, and it is stated that the early French settlers obtained considerable quantities of fuel from that place. The chief part of the coal field is on the Gaspé side of the river, where a good exploration, I have no doubt, would be rewarded by some very important discoveries.

IRON ORE.

There are beds of bog ore, or argillaceous oxide of iron, near the Tobique. This variety of iron ore is chiefly employed in the manufacture of cast-iron, and it would probably be advantageously used by mixing it with the hematite iron of Woodstock. Bog iron ore is collecting in many of the low swampy tracts in the Province, by being washed from the soil by rains, melting snows, &c. with these ochres are sometimes found. The red and brown oxides of iron might be manufactured into pigments.

An inexhaustible supply of iron ore has been discovered at Woodstock, and is already described.*

LEAD ORE.

Small seams of galena sometimes appear in the limestones of the Bay Chaleur, but none have yet been discovered of sufficient thickness to be profitably worked.

* See Fourth Report on the Geological Survey of the Province of New-Brunswick—page 45.

Lead ore has been discovered at the head of the Little Nepisiguit, in the County of Gloucester; but I have not had an opportunity to examine that part of the Province. There are also indications of lead on the Tete-a-gouche River.

MANGANESE.

Manganese ore occurs in the slate of the Tete-a-gouche River, about eight miles from Bathurst, where it was recently discovered by William Stephens, Esquire. At this place a mine has been opened by the Gloucester Mining Association. One hundred and twenty-five tons of ore have already been shipped to England, where it sold for one thousand pounds.

The Association has had to contend with many difficulties, and a large sum of money has been expended in mining, opening roads, and erecting machinery for clearing the ore at a fall in the river. As far as the mining has proceeded the ore has been found in numerous narrow veins, but as these are pursued they increase in thickness, and it is probable that they unite and form a perfect lode. The greatest credit is due to Mr. Stephens for his zeal and ability, and it is to be hoped that the enterprise in which he is engaged will be finally successful.

COPPER ORE.

Copper ore has also been found near Bathurst. In one instance it was discovered in the sandstones of the Coal Measures, having evidently been produced by infiltration. It has also been discovered on the Tete-a-gouche River, where the older slates are metalliferous.

The following minerals are chiefly useful as objects of science:—

Iron pyrites.
Carbonate of Lime.
Fluats of Lime.
Chabasic.
Quartz.
Zeolite.
Talc.
Asbestos.
Chlorite.

In concluding the present Report, some allusion may be made to the mineral wealth of the Province, as having been in a great degree made known by the Geological exploration.

The great extent of the Coal Fields of New-Brunswick alone, are sufficient to secure that degree of importance to the country its position among the North American Colonies is so well adapted to sustain. But besides the Coal, there are inexhaustible supplies of Iron, with Copper, Manganese, Lead, and other useful ores. The Province abounds in Granite, Freestone, Marble, and all those rocks employed in ornamental and durable architecture. There are also numerous substances employed in the arts and manufactures, which are ready to be brought into operation when the state of the Province shall require them.

In addition to vast stores of mineral wealth, the fisheries are extensive, the soil is fertile, and the climate such as to admit of the most luxuriant growth of all those grains and other plants for which Canada has been celebrated.

For the beauty of its natural scenery and number of its interesting objects, New-Brunswick can scarcely be surpassed, and whether considered in reference to objects of science or the increase of human happiness and contentment, the bounties of nature are every where to be seen, and the gifts of a kind Providence for the support of the human race have been bountifully bestowed over the land.

I have the honour to be,

Your Excellency's most obedient,

And very humble Servant,

ABRAHAM GESNER,

PROVINCIAL GEOLOGIST.

Saint John, N. B., 1st January, 1843.

APPENDIX.

LIME IN AGRICULTURE.

It is well known that lime in its pure state, or quicklime, will destroy plants; but lime when combined with carbonic acid is a most useful ingredient in soils. When quick or slaked lime is mixed with moist vegetable matter, a new compound is formed which is soluble in water, and thus inert substances are rendered nutritive. Quicklime in its progress to a mild state brings insoluble matter into such a condition that it is directly applicable to the growth of plants. It renders peaty soils and such as abound in roots, or any kind of vegetable matter, fit for cultivation. Soils which do not effervesce in acids are generally improved by lime, whether they are clays or sands; but when a soil deficient of calcareous matter abounds in soluble vegetable manure, quicklime should be avoided. Lime should never be applied with animal manures, or common dung, for, by rendering the extractive matter insoluble, it is injurious under such circumstances.

In New-Brunswick lime will be found a valuable manure for the light sands, and stiff clays which are generally deficient in calcareous matter. It will also completely renovate the peaty soils; and by being mixed in composts may be made generally applicable to lands of almost every description.

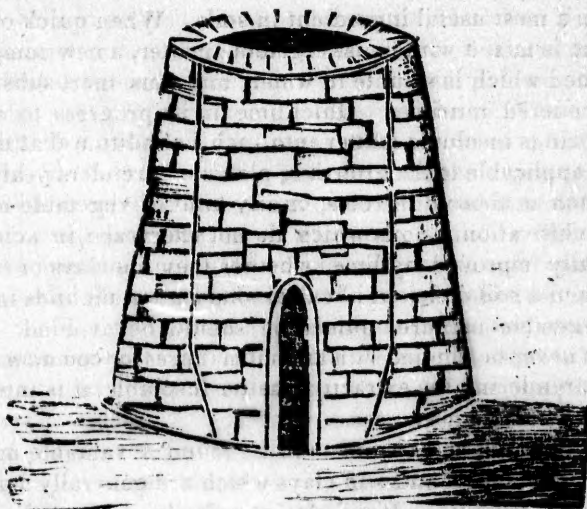
The best limestones will effervesce briskly when a little sulphuric, nitric, or muriatic acid is dropped upon them. Each of the acids should be diluted with one part of water before it is

used as a test for limestone, and either will afford a sufficient guide in determining the quality of the rock previous to the erection of a kiln, or actual burning.

Lime is obtained from the native rock by exposing it to a strong heat in a kiln by which the carbonic acid of the limestone is expelled and quicklime produced.

The best form for a kiln is that of a cylinder largest at the bottom outside and smallest at the bottom inside. This form affords ample support for the kiln, and from the decreasing diameter of the circular cavity on the inside the charge is kept up, the arch relieved of weight, and the heat more equally distributed.

The dimensions of a kiln of moderate size would be ten feet in diameter on the outside at the bottom, seven feet in diameter at the top outside, with a height of ten or twelve feet. The archway may be four and a half or five feet high, and two feet four inches wide, as represented by the following wood cut.



The bore or hollow of the inside should diminish in size from the top of the archway downwards equal to one half the diameter at the bottom. The kiln must be built of rocks that are capable of enduring a strong heat. Clay slate, grauwacke,

and some of the freestones and flagstones of the Province are well adapted for the purpose. The rocks should be laid in mortar, and the inside of the kiln should be plastered, the air being excluded on all sides except at the archway and top.

Near the kiln there should be a shed to keep the lime after it is burned from the rain and weather.

In charging the kiln the limestone is broken into pieces of a few pounds weight. An arch is built opposite the archway to admit the fuel. After the arch is completed the kiln may be filled with broken limestone to the top. The arch being filled with wood, and the fire kindled, the heat must be gradually increased until the limestone be sufficiently burned to slake readily. In general, when the charge is sufficiently burned, the smoke at the top of the kiln disappears, and the flame of the fuel rises in its stead; the charge also sinks down a few inches.

Some kinds of limestone require a stronger heat than others, a little experience is therefore necessary to accomplish the work well and with precision, and it may be remarked that the rock when it is first taken from the quarry requires less heat for its calcination than when it has been exposed some time to the sun and the weather.

If the heat should be too great, the limestone will melt and run into slag; but after burning a kiln or two of any kind of limestone, any person of observation will acquire that kind of knowledge which is necessary in all practical operations.—The gases that escape from kilns while the limestone is burning are unwholesome, and it is desirable that all kilns should be at some distance from dwelling houses.

As soon as the lime is sufficiently burned, time should be allowed for it to cool, when it must be removed from the kiln, for it expands with great force during the process of slaking, and if it should be exposed to rains or moisture in the kiln, it will force the walls apart or greatly injure them.

